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MAMMALS OF THE NORTHERN TEXAS PANHANDLE

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The northern part of the Texas Panhandle has received less attention from a biological perspective than have most contiguous areas of similar size in the state. Reasons for this inattention are not readily apparent, but they may relate to one or more of the following: extremes in temperature exceeding those in most other regions of the state; a relatively depauperate fauna and flora as compared to many other areas; less scenic countryside, except to the keen observer willing to look for it; and distance from major centers of biological study. In any event, our interest focused on the northern Panhandle precisely because its mammalian fauna had not been examined in detail previously. Our study unit, sometimes referred to in text as Trans-Canadian Texas, comprises that part of the state lying north of the Canadian River, which bisects the Panhandle. This includes all of seven counties—Dallam, Hansford, Hartley, Lipscomb, Moore (except southeastern tip), Ochiltree, and Sherman—and the northern parts of five more—Hemphill, Hutchinson, Oldham, Potter, and Roberts.

The entire northern Panhandle lies in the High Plains physiographic section of the Great Plains Province, although some maps show the eastern edge of the region as within the Rolling Plains (Plains Border) section (see Gould, 1975). This is a flat to gently rolling landscape, mostly with little relief except where cut by flowing water, sloping gradually downward from west to east. Elevations range from about 4600 feet along the New

Mexican border to about 2200 feet along the Canadian River at the Oklahoma border in eastern Hemphill County. The total area of Trans-Canadian Texas is approximately 9225 square miles and comprises about 5.9 million acres.

As noted, the study area is bounded on the south by the Canadian River, which heads in New Mexico and has cut a relatively wide valley across the Texas Panhandle. This cutting action and that of creeks and intermittent streams draining into the Canadian has exposed the rocky layers beneath the High Plains. The exposed rock and rocky slopes along the river and its tributaries (including eastward-flowing Wolf Creek and those streams that drain northward into the North Canadian system) provide important habitats for some species of mammals. Geologically and physiographically, the rough country along the river and its tributaries is referred to as the "breaks" of the Canadian. The exposed rock is of Triassic (mostly to the west) and late Permian age.

The northern Panhandle has a dry steppe climate, not unlike that of many of the world's interior grasslands, with a high evaporation rate. Summers are hot and winters relatively cold, although much milder than on the High Plains to the north of Texas. January is the coldest month and July the warmest. Rainfall occurs mostly in the form of thundershowers, which reach a peak in late spring and early summer. Snowfall generally is light, ranging between 10 and 16 inches each winter, but extremes of a trace to more than 30 inches are on record for one or more of the weather stations in the area. Even after a modest snowfall, snow cover usually is minimal because of drifting. The area is subjected to sudden, sometimes pronounced, climatic shifts, especially in winter and early spring. Strongest winds occur during thunderstorms and in spring, principally in March and April; the latter are mostly from a westerly direction and may carry considerable dust. The growing season (freeze-free days) varies approximately from 178 days in Dallam County to 204 in Hemphill County. Some comparative climatic data from Dalhart, Dallam County, in the west and Miami, Roberts County, in the east are given in Table 1.

Most of the land covered by the Canadian breaks and some 25 to 30 percent of that on the High Plains to the north is utilized as cattle range. Sandy to sandy-loam soils predominate in these areas. On clay-loam and other loamy soils, croplands have been established, some irrigated and some dry. Winter wheat is by far

TABLE 1.—Comparative climatological data from Dalhart, Dallam County (1949-1969), in the west, and Miami, Roberts County (1951-1975), in the east of the northern Texas Panhandle.

	Dalhart, Dallam County	Miami, Roberts County
Moisture (inches)		
Mean annual precipitation	13.10	20.66
Mean annual snowfall	16.25	11.60
Temperature (°F)		
Average January		
Minimum	18.7	19.9
Maximum	50.1	49.6
Average July		
Minimum	63.8	66.4
Maximum	91.5	93.6
Average annual		
Minimum	40.5	42.8
Maximum	70.7	71.6

the most important seed crop, but corn and milo also are grown. Many areas north of the Canadian also produce oil and natural gas of considerable import to the local economy.

Discounting the large areas now under cultivation, major vegetation types (McMahan *et al.*, 1984) consist of cottonwood-hackberry-saltcedar association along the Canadian, mesquite-juniper brush along the scarps, blue grama-buffalograss grasslands in the northwest, sand-sage-Havard shin oak brush, and mesquite-shrub grassland. Figures 1 through 12 depict habitats typical of the Trans-Canadian region.

METHODS AND ACKNOWLEDGMENTS

Our field studies on mammals in the northern Texas Panhandle began in the summer of 1984. Since that time, we have visited the region on many occasions each year, in all seasons, and one or more of the authors have collected specimens in each of the 12 counties. Field efforts were terminated at the end of July 1988.

In the course of field work, we employed Museum Special snap traps, Victor rat traps, and Sherman live traps to capture small mammals, along with specialized commercial traps for moles and pocket gophers. Bats were trapped in mist nets, lagomorphs and small carnivores were hunted with guns, and some animals were salvaged after being killed by vehicles on roadways. We also gathered information about mammals of the region from farmers



FIG. 1.—Canadian River near Boys Ranch, Oldham County.



FIG. 2.—Riparian growth in Canadian River floodplain, Oldham County.

and ranchers, and secured both data and specimens from trappers. Mr. T. L. Clark of the Texas Parks and Wildlife Department kindly provided facts on introductions and annual harvests of ungulates in the region, and that agency issued the appropriate scientific collecting permits to cover our field activities.

Approximately 2200 specimens are listed as examined in the accounts below. Most of these are in the collection of The



FIG. 3.—Rocky outcropping on Romero Creek, Oldham County.



FIG. 4.—Rita Blanca Creek west of Channing, Hartley County.

Museum, Texas Tech University, and carry no institutional designation. Some, however, are housed in other collections and we are grateful to the following persons for allowing us to examine specimens or for loan of material in their care (identifying acronyms in parentheses): E. B. Stangl, Jr., and W. W. Dalquest, Midwestern State University (MWSU); R. M. Timm, Museum of Natural History, The University of Kansas (KU); C.



FIG. 5.—Rangeland west of Channing, Hartley County.



FIG. 6.—Canadian River floodplain between Borger and Stinnett, Hutchinson County. Salt cedar in foreground, breaks south of river in distance.

S. Thaler, Jr., New Mexico State University (NMSU); D. J. Schmidly, Texas Cooperative Wildlife Collection, Texas A&M University (TCWC); D. E. Wilson and R. D. Fisher, National Museum of Natural History, Smithsonian Institution (USNM); R. F. Martin, Texas Memorial Museum, University of Texas (UT); F. C. Killebrew, West Texas State University (WTSU).

David J. Schmidly of Texas A&M University graciously shared with us data he had collected on Texas mammals housed in a number of museums in the United States. Those not directly examined by us, and from localities not otherwise represented in



FIG. 7.—Rocky slope south of Stinnett, Hutchinson County.



FIG. 8.—Sand-sage community in Pats Draw, northwestern Roberts County. Cottonwoods along dry creek in background.

our listings, are included under "additional records" in the accounts of species. Acronyms (and institutions represented) identifying such specimens are: AMNH (American Museum of Natural History, New York); CMNH (Carnegie Museum of Natural History, Pittsburgh); MCZ (Museum of Comparative Zoology, Harvard); MVZ (Museum of Vertebrate Zoology, University of California, Berkeley); UIMNH (University of



FIG. 9.—Canadian breaks in northwestern Roberts County. Bats were netted over intermittent stream at clump of trees in right-of-center background.



FIG. 10.—Riparian growth and scarps on Wolf Creek, southeastern Ochiltree County.

Illinois Museum of Natural History); UMMZ (University of Michigan Museum of Zoology). Also listed as additional records are specimens reported in the literature, with appropriate citation, from localities whence we did not examine material.

Most place-names used in text can be found on modern commercial highway maps. Others were found on county soil



FIG. 11.—Wolf Creek just north of Lipscomb, Lipscomb County.



FIG. 12.—Canadian River north of Canadian, Hemphill County.

survey maps or on those in the publication *County Maps of Texas*, issued in 1987 by the Texas Department of Highways and Public Transportation. In several cases, recourse to accounts of county or regional histories was necessary to locate older names. To the best of our knowledge, we listed only specimens from north of the Canadian in those counties bisected by the river. In two cases, this calls for further explanation. Currently, Tascosa is

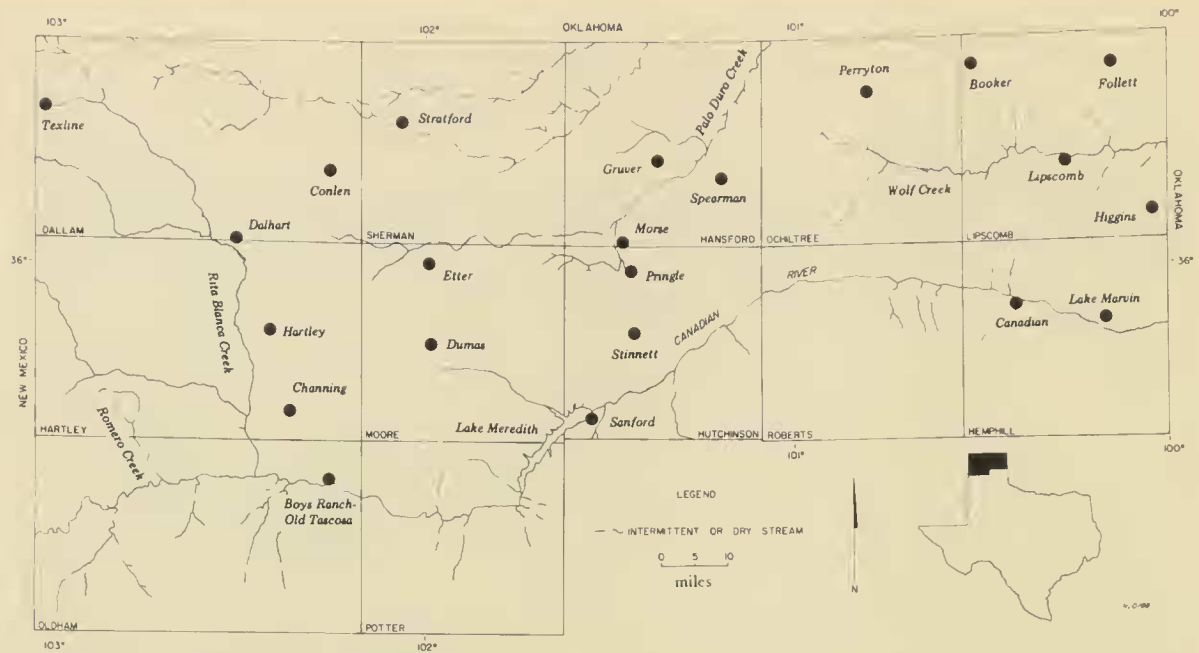


FIG. 13.—Map of northern Texas Panhandle showing many place-names used in text.

represented on maps as a railroad siding just to the south of the Canadian in Oldham County. However, the early town by the same name was located on the north side of the river (see map in Bailey, 1905). The town of Canadian, seat of Hemphill County, is now, and always has been, on the south side of the river. However, much (if not all) of the collecting done there at the turn of the century by personnel of the U. S. Biological Surveys was along Clear Creek, which drains into the Canadian from the north to the northeast of the town (see accounts of coyote and muskrat in Bailey, 1905, for example). Thus, all specimens labeled as from "Canadian" in the national collection are here included. Most locality names used in text are shown on Figure 13.

For assistance in the field, we thank L. L. Choate, C. S. Hood, D. A. McCullough, and R. J. Pesaturo, all graduate students at one time or another at Texas Tech University. We also are grateful to many citizens of the Trans-Canadian region for providing information about mammals, granting us permission to conduct field work on their property or land in their care, and providing many other kindnesses. We are especially mindful of the assistance rendered by Layne Allen, formerly of Perryton, Texas, who sought out collecting sites for us, provided information on large mammals of the region, and helped us collect specimens, including skeletal material of furbearers trapped by him. At Texas Tech University, The Museum, the

Department of Biological Sciences, the Graduate School, and the Office of Academic Affairs and Research all contributed materially to funding the cost of field operations.

ACCOUNTS OF SPECIES

In the accounts that follow, 54 species of mammals that occur, or once occurred, in the northern Texas Panhandle are treated. Although ordinal and familial headings are not utilized, accounts are in currently accepted phylogenetic sequence through genera; species are arranged alphabetically under each genus. A listing of 22 species, also ordered phylogenetically, of taxa that may occur, or once may have occurred, in the region is appended. All included measurements are in millimeters and weights are expressed in grams. Measurements and comments on morphology and reproduction relate to adult animals unless otherwise noted; weights of pregnant females are excluded. Cranial measurements were taken to the nearest .01 millimeter by the same person with the same pair of digital calipers.

Didelphis virginiana virginiana Kerr, 1792 Virginia Opossum

Although museum specimens are few, the opossum probably occurs over much of the northern Panhandle, albeit sparingly in many places. It is to be looked for especially along watercourses and in the vicinity of human habitations, particularly in the eastern part of the region.

Specimens examined (2).—HUTCHINSON Co.: Stanford Dam, 1. MOORE Co.: 12 mi. E Dumas, 1 (WTSU).

Additional records.—HUTCHINSON Co.: 9 mi. E Stinnett (Blair, 1954:241). LIPSCOMB Co.: Higgins (MVZ).

Cryptotis parva parva (Say, 1823) Least Shrew

This diminutive shrew probably is limited mostly to mesic habitats in the eastern part of the region, although it recently has been taken in extreme eastern New Mexico (see especially Owen and Hamilton, 1986). Use of pit-fall (can) traps and analysis of contents of owl pellets are recommended for securing distributional records of this and other shrews. To our knowledge, pit-fall traps never have been used in the Texas Panhandle and only a few owl pellets from there have been analyzed. (These animals also frequently seek cover under fallen debris.)

Blair (1954) reported four *C. parva* taken from within a cottonwood log in the floodplain of Bugby Creek in Hutchinson County, and found another in the stomach of a small diamond-backed rattlesnake. One of four adult females still was molting on 22 June; the others were in fresh summer pelage.

Specimens examined (7).—HEMPHILL CO.: Lake Marvin, 1 mi. N, 12 mi. E Canadian, 3 (KU). HUTCHINSON CO.: 9 mi. E Stinnett, 4 (UT).

Notiosorex crawfordi crawfordi (Coues, 1877)

Desert Shrew

The desert shrew no doubt occurs throughout much of the Trans-Canadian Panhandle, although only five specimens currently are available to document its occurrence there. Small shrews are captured only rarely in conventional live traps and break-back traps, and special means often must be taken (see account of *Cryptotis*) to collect them.

Blair (1954) reported taking two specimens by tearing apart fallen cottonwood logs in the floodplain of Bugby Creek, 9 mi. E Stinnett. The specimen from Hansford County was recovered from a cast pellet of a great-horned owl, whereas the one from Hartley County was live-trapped in sand-sage habitat just west of Rita Blanca Creek.

Specimens examined (5).—HANSFORD CO.: 10 mi. S, 3 mi. E Gruver, 1 (KU). HARTLEY CO.: 1.5 mi. S, 6 mi. W Channing, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 2 (1 USNM, 1 UT). MOORE CO.: 7 mi. S, 14 mi. E Dumas, 1.

Scalopus aquaticus aereus (Bangs, 1896)

Eastern Mole

Moles are common along the Canadian River and most of its tributaries and the distribution well may reach New Mexico, where *S. aquaticus* presently is unreported. The species is to be looked for also in the North Canadian drainage in the northern part of the region. Aside from localities from which specimens have been collected or reported in the literature, we have observed tunnels of active moles west of Boys Ranch in Oldham County, at the city dump just south of Dumas, along Wolf Creek in Lipscomb and Ochiltree counties, and at several places along the Canadian Valley in Roberts County (see Fig. 14). Except in protected mesic areas near permanent water in the Panhandle, local distribution of the eastern mole no doubt expands and contracts in response to seasonal and annual fluctuations in precipitation. Well-watered golf courses, cemeteries, and gardens often provide suitable habitat for this species.



FIG. 14.—Distribution of *Scalopus aquaticus* in northern Texas Panhandle. Solid symbols represent specimens, open symbols represent localities where mole activity has been observed.

Blair (1954) reported moles as common on the sandy floodplain and on stabilized dunes along Bugby Creek in Hutchinson County. At Tascosa in 1899, Bailey (1905:207) “found mole ridges common over the sandy river bottoms.” We took one individual, and saw evidence of others, in the sandy valley of Rita Blanca Creek in Hartley County, a locality only some 35 miles east of the Texas-New Mexico border. In the late winter and spring of 1988, we trapped this species in sand-sage habitat in the Pats Draw area of northwestern Roberts County. The draw was a mile or more wide at the several places we collected and the whole area was literally honeycombed with mole tunnels; a dry creekbed (Pats Creek), lined with a few cottonwoods, some dead, ran southwardly the length of the draw into the Canadian. None of us had ever seen eastern moles so concentrated under natural conditions as in Pats Draw, where *Geomys* also was found, and where the soil gave way under almost every step because of the burrowing activity of these species. The same situation may prevail in some other of the sandy draws draining to the river.

A female taken on 15 May carried three fetuses (18 in crown-rump length), whereas two taken on 16 May and one on 10 June evinced no reproductive activity. Adult males taken in mid-March and mid-April had testes that measured 10 in length. May-taken adults were in summer pelage. An animal trapped on 17 March still had the golden-tinted winter pelage, whereas one captured

on 15 April was in the process of seasonal molt, both dorsally and ventrally.

Specimens examined (25).—HARTLEY CO.: 1.5 mi. S, 6 mi. W Channing, 1. HEMPHILL CO.: 6 mi. E Canadian, 1; 12 mi. E Canadian, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 13 (UT); below dam, Lake Meredith, 1 (WTSU). MOORE CO.: Blue Creek Rec. Area, Lake Meredith, 1 (WTSU). ROBERTS CO.: 13 mi. S, 11 mi. E Spearman, 3; 15-16 mi. S, 11 mi. E Spearman, 4.

Additional records.—HEMPHILL CO.: Canadian (Bailey, 1905:207). LIPSCOMB CO.: Lipscomb (Yates and Schmidly, 1977:27). OLDHAM CO.: Tascosa (Bailey, 1905:207). See also text above and Figure 14.

Eptesicus fuscus pallidus Young, 1908

Big Brown Bat

This widely distributed bat may be found to occur at a number of places in the northern Panhandle with the advent of additional collecting efforts, principally because of its propensity to utilize buildings as roost sites. Presently, however, it is known only from three localities in the Canadian breaks in the southern part of the region and two school houses in the northern tier of counties (Manning *et al.*, 1989).

Of specimens from Potter County collected in mid-August, one was taken in a mist net strung over a small stream, whereas the others were netted at the entrance to a barn used as a night roost in company with pallid bats (*Antrozous pallidus*). Testes of males measured 9-11 in length. Two males (testes, 5, 6) from Roberts County were caught in mid-May in a net stretched over a water hole in an otherwise dry creekbed that coursed down a canyon near the northern edge of the eroded Canadian breaks. Both deciduous trees and juniper lined the draw. *Antrozous* and two species of *Lasiurus* were taken in the same net. A volant young-of-the-year was netted at the same place on 30 July when the creek contained running water. Blair (1954) reported *E. fuscus* as "common over cottonwood groves" along Bugby Creek in Hutchinson County, where adult females and volant young-of-the-year were taken in late June and early July.

At Perryton in mid-June, custodial personnel collected four specimens from "about 20" that were wedged into a crevice no more than half an inch in width behind a board joining the brick surface of Central Junior High School to a corrugated-covered walkway. The four consisted of an adult female and three nonvolant young of two different sizes. At the high school in Spearman, a presumably volant young-of-the-year (forearm, 47) was found alive on a hallway floor on 13 July.

Specimens examined (22).—HANSFORD CO.: Spearman, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 8 (UT). OCHILTREE CO.: PETRYON, 1. POTTER CO.: 16 mi. N Amarillo, 5; 15 mi. N Amarillo, 1. ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 3.

Lasiurus borealis (Müller, 1776)

Red Bat

This migratory, tree-roosting bat occurs sparingly in the Trans-Canadian Panhandle in the warm months, being limited to wooded waterways and a few urban areas. All four available specimens are females, which remain on the southern plains to bear young in late spring. A lactating individual was the only bat netted on 26 July in Lipscomb County over a spring in a small, open canyon. A female reported by Blair (1954:242) was shot on 11 July "over a cottonwood grove" in Hutchinson County. One from Roberts County was netted as described in the account of *Eptesicus*; it carried four fetuses (crown-rump length, 10) on 16 May. The fourth female was obtained in the town of Gruver on 15 July. We follow Baker *et al.* (1988) in regarding *L. borealis* as a monotypic species.

Specimens examined (4).—HANSFORD CO.: GRUVER, 1 (KU). HUTCHINSON CO.: 9 mi. E Stinnett, 1 (UT). LIPSCOMB CO.: 8 mi. NW Higgins, 1. ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 1.

Lasiurus cinereus cinereus (Palisot de Beauvois, 1796)

Hoary Bat

This migrant species winters in México and Central America and spends the warm months mostly to the north of the Panhandle region. The two available records, therefore, probably represent migrant individuals, although a female taken in Roberts County (see account of *Eptesicus*) on 16 May was gravid with two fetuses (12 in crown-rump length) and conceivably would have borne and raised her young there. In spring and summer, males migrate to higher elevations and latitudes than do females. The specimen from Gruver was brought in by a housecat on 19 September 1954.

Specimens examined (1).—ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 1.

Additional records.—HANSFORD CO.: GRUVER (CUTLER, 1959b:112).

Antrozous pallidus bunkerii Hibbard, 1934

Pallid Bat

Although apparently limited mostly to (or near) the breaks of the Canadian and its tributaries in the study area, this colonial species is locally common where it occurs. We netted a series of

adults, all but two males (testes 5-7 long), over Romero Creek in Oldham County in July and August, and another, which included adults and young-of-the-year of both sexes, in mid-August at the entrance to a barn used as a night roost in Potter County. Of five adults taken in a net over a small pond in a draw in northwestern Roberts County (see account of *Eptesicus*) on 16 May, four were males (testes 3-5 in length); one female carried twin fetuses that measured 6 in crown-rump length.

Martin and Schmidly (1982) referred the few *A. pallidus* available to them from the Texas Panhandle to the subspecies *pallidus*. However, study of the specimens listed below and others from nearby areas has convinced us (Manning *et al.*, 1988) that all are best assigned to *A. p. bunkerii*, the type locality of which is just beyond the Oklahoma border in southwestern Kansas.

Specimens examined (82).—OLDHAM CO.: 17-18 mi. N, 1 mi. W Adrian, 43; Tascosa, 1 (USNM). POTTER CO.: 16 mi. N Amarillo, 33. ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 5.

Dasypus novemcinctus mexicanus Peters, 1864

Nine-banded Armadillo

We have examined no specimens of the armadillo from Trans-Canadian Texas, but it was reliably reported to us that one was killed along a roadway 7 mi. NW Higgins, Lipscomb County, in the summer of 1985 (Hollander *et al.*, 1987). Mr. Bill Aduddell, a ranch foreman in Roberts County, indicated to us that there were scattered reports of armadillos from that area. This, coupled with the fact that we have examined specimens from south of the Canadian in the Panhandle and that the species has been reported to the northward in Oklahoma and Colorado, leads us to assume that it occurs in at least the eastern part of the region.

Sylvilagus audubonii neomexicanus Nelson, 1907

Desert Cottontail

This is the more common and widespread of the two species of cottontails occurring in the northern Texas Panhandle because it is an upland rabbit that occurs in both rangelands and agricultural areas. Occasionally, *S. audubonii* and *S. floridanus* are found together in irrigated croplands. For example, at a place 2 mi. S and 4 mi. E Perryton, we shot an individual of one species in a bar ditch on one side of a county road and an individual of the second species adjacent to a culvert on the other side.

Adult females in our collection yielded the following reproductive information: 15 April, one pregnant with five fetuses that measured 65 in crown-rump length; 16 May, one lactating; 9 June, one gravid with four, near-term fetuses (90 in crown-rump length); 10 June, one carrying three fetuses (40 in crown-rump length); 27 October, one, no evident reproductive activity. A juvenile male obtained on 16 May had minute testes; adults collected on 19 March, 16 May, and 4 June had testes 45, 50, and 50 in length, respectively.

Specimens examined (15).—HARTLEY CO.: 8 mi. SW Dalhart, 1; 3 mi. S Channing, 1. HEMPHILL CO.: Gene Howe Wildlife Management Area, 1. HUTCHINSON CO.: Spring Canyon Rec. Area, Lake Meredith, 1 (WTSU). LIPSCOMB CO.: 2.5 mi. E Booker, 1 (WTSU); 4 mi. E Booker, 1 (WTSU). MOORE CO.: 3.5 mi. W Etter, 1. OCHILTREE CO.: 2 mi. S, 4 mi. E Pertyton, 1; 7 mi. S, 2 mi. E Pertyton, 1. OLDHAM CO.: 18 mi. N, 1 mi. W Adrian, 1; 6 mi. W Boys Ranch, 2. ROBERTS CO.: 10 mi. S, 11 mi. E Spearman, 3.

Additional records.—DALLAM CO.: 16 mi. ENE Texline (UIMNH); Texline (Nelson, 1909:236). HARTLEY CO.: 14 mi. SSE Channing (UIMNH). HUTCHINSON CO.: 9 mi. E Stinnett (Blair, 1954:243). LIPSCOMB CO.: Lipscomb (Nelson, 1909:236). MOORE CO.: 4 mi. W Dumas (UMMZ). OLDHAM CO.: Tascosa (Nelson, 1909:236). POTTER CO.: 18 mi. SE Channing (UIMNH).

Sylvilagus floridanus llanensis Blair, 1938

Eastern Cottontail

In the northern Panhandle, this species is found primarily in bottomlands—along the Canadian River, its tributaries, and other streams in the region. It also is found, however, in irrigated croplands, in urban areas, and around well-watered rural homesteads. Among our specimens, for example, is one shot in an opening in deciduous woodland along Wolf Creek, and another taken in the mowed yard of an unoccupied farmstead.

The two species of cottontails in northwestern Texas, *S. audubonii* and *S. floridanus*, are similar in external appearance, but the latter has shorter ears (usually less than 60), and is slightly darker overall dorsally, with darker ears and a greater suffusion of buffy orange on the head, nape, back, and legs. Average and extreme external measurements of three female *floridanus* followed by those of seven *audubonii* (four males, three females), all adults, are: total length, 406.7 (386-424), 383.6 (356-418); length of tail, 54.0 (51-56), 48.0 (34-54, except one 72); length of hind foot, 95.0 (94-96), 88.9 (81-92); length of ear, 57.6 (54-59), 65.4 (63-68). Cranially, *floridanus* has much smaller auditory bullae and a smaller auditory meatus than does

audubonii, a broader mesopterygoid fossa, and a longer maxillary toothrow.

A female obtained on 15 April carried eight fetuses (10 in crown-rump length) as did another (fetuses 28 in crown-rump length) that also was lactating on 17 May; another lactating animal was taken on 20 May.

Specimens examined (18).—DALLAM CO.: 10 mi. E Texline, 2; 16 mi. E Dalhart, 1000 ft., 1 (TCWC). HANSFORD CO.: 10 mi. S, 3 mi. W Gruver, 1 (KU). HEMPHILL CO.: 8 mi. ENE Canadian, 2 (TCWC); Canadian, 2 (USNM). HUTCHINSON CO.: 7 mi. N Stinnett, 1 (WTSU). LIPSCOMB CO.: 4 mi. E Booker, 1 (WTSU). MOORE CO.: 7.5 mi. N Dumas, 1 (WTSU); 5 mi. E Dumas, 2 (WTSU); Blue Creek Rec. Area, Lake Meredith, 1 (WTSU). OCHILTREE CO.: 2 mi. S, 4 mi. E Perryton, 1; 12 mi. S, 9 mi. E Perryton, 1; 9 mi. S, 11 mi. E Spearman, 2.

Additional records.—DALLAM CO.: 6 mi. SW Stratford (UIMNH). LIPSCOMB CO.: Lipscomb (Nelson, 1909:176).

Lepus californicus melanotis Mearns, 1890

Black-tailed Jackrabbit

The black-tailed jackrabbit is a widespread and often common inhabitant of the northern Texas Panhandle, both in open rangeland and along the borders of cultivated fields. It is one of the species most often killed by vehicles on roads. However, in the late winter and spring of 1988, numbers of this lagomorph seemed especially low in the region, much lower than in any of the previous three years.

Reproductive data gathered on *L. californicus* included a gravid female taken on 19 March that carried three fetuses (15 in crown-rump length) and another shot on 17 May that contained two large fetuses (70 in crown-rump length). A juvenile male obtained on 17 May had testes 5 in length, whereas adult males collected on 14 January and 15 April had testes that measured 50 and 42, respectively.

Specimens examined (11).—HANSFORD CO.: 1 mi. N, 2 mi. E Gruver, 1 (KU). HARTLEY CO.: 15 mi. W Dumas, 1 (WTSU). LIPSCOMB CO.: 1.5 mi. N, 3 mi. W Catesby, Oklahoma, 1 (WTSU); 2 mi. E Booker, 1 (WTSU). MOORE CO.: 10 mi. W Dumas, 1 (WTSU). HEMPHILL CO.: Canadian, 1 (USNM). OCHILTREE CO.: 0.25 mi. S Perryton, 1; 9 mi. S, 11 mi. E Spearman, 1. ROBERTS CO.: 13 mi. S, 11 mi. E Spearman, 1; 21 mi. N, 13 mi. W Miami, 1. SHERMAN CO.: 5 mi. N Stratford, 1.

Additional records.—DALLAM CO.: Texline (Nelson, 1909:148); 5 mi. N Dalhart (CMNH). LIPSCOMB CO.: Lipscomb (Nelson, 1909:148).

Spermophilus pilosoma marginatus V. Bailey, 1890

Spotted Ground Squirrel

The spotted ground squirrel occurs throughout the northern Panhandle region of Texas. Not so common and widespread as *S.*

tridecemlineatus, this species is found predominantly in habitats on sandy soils. Blair (1954:245), for example, collected specimens in Hutchinson County "on deep sand with a vegetative cover of sand sage and grass." Our series from Oldham County was taken along a ranch road through rangeland with a sandy-gravelly substrate that supported buffalograss, cholla, and other aridland plants, whereas ground squirrels from Dallam and Hartley counties were shot along roadways in sandy grassland.

Two females from 10 mi. E Texline each carried nine fetuses (crown-rump lengths 24 and 28 on 17 and 20 May, respectively). Adult males taken there on 18 and 20 May had testes 23 and 25 in length, whereas one from Oldham County shot on 23 August had testes that measured only 7. Females from north of Dalhart (20 April) and Lipscomb County (two, 20 May) evinced no reproductive activity. One taken in Hartley County on 10 June was in postlactating condition.

Specimens examined (17).—DALLAM CO.: 10 mi. E Texline, 4; 21 mi. N Dalhart, 1 (MWSU). HARTLEY CO.: 6.5 mi. E Channing, 1. HEMPHILL CO.: Canadian, 1 (USNM). HUTCHINSON CO.: 4 mi. S, 13 mi. E Pringle, 1 (KU); 9 mi. E Stinnett, 3 (UT). LIPSCOMB CO.: 2 mi. NW Lipscomb, 2 (MWSU); Lipscomb, 1 (USNM). OLDHAM CO.: 17 mi. N, 1 mi. W Adrian, 3.

Additional records.—DALLAM CO.: Dalhart (AMNH). HARTLEY CO.: Romero (AMNH).

Spermophilus tridecemlineatus arenicola A. H. Howell, 1928
Thirteen-lined Ground Squirrel

This is a widely occurring and common sciurid throughout the Texas Panhandle. We have records of occurrence from 11 of the 12 counties in the study area. *Spermophilus tridecemlineatus* favors short-grass habitats, and frequently is found, therefore, along regularly mowed roadsides, in grazed rangelands, in parks and cemeteries, on golf courses, and in similar situations. As in *S. spilosoma*, these squirrels hibernate in the cold months—from late summer or early autumn (young-of-the-year are the last to become dormant) until mid-March or early April. Individuals that emerge in spring before a last, late snowfall occasionally will burrow through new snow to reach the surface. Conversely, some may be active for a day or two during an unseasonably warm spell in mid-winter.

A female shot in Roberts County on 16 May carried nine near-term fetuses. One taken on 18 May in Lipscomb County was lactating. Most collections made after about 1 July contain a large percentage of young animals.

Specimens examined (40).—DALLAM CO.: 1 mi. N, 3 mi. W Dalhart, 1. HANSFORD CO.: 8 mi. N Spearman, 1 (WTSU); Gruver, 2 (KU); 8 mi. S Spearman, 1. HARTLEY CO.: 1 mi. S Dalhart, 12. HUTCHINSON CO.: 9 mi. E Stinnett, 1 (UT). LIPSCOMB CO.: 2 mi. E Booker, 1 (WTSU); 2 mi. NW Lipscomb, 1 (MWSU); Lipscomb, 3 (USNM); 13 mi. S, 13.5 mi. W Lipscomb, 1. MOORE CO.: 2 mi. N Masterson, 3700 ft., 1. OCHILTREE CO.: Perryton, 12. ROBERTS CO.: 10 mi. S, 11 mi. E Spearman, 2. SHERMAN CO.: 3 mi. SW Texoma, 1.

Additional records.—DALLAM CO.: 20 mi. E Texline (Howell, 1938:12). HEMPHILL CO.: no specific locality (Davis, 1974:148). MOORE CO.: 4 mi. W Dumas (UMMZ). POTTER CO.: no specific locality (Davis, 1974:148).

Cynomys ludovicianus ludovicianus (Ord, 1815)

Black-tailed Prairie Dog

Once a widely distributed and common rodent on the High Plains, the prairie dog now occurs only in isolated, albeit not infrequent, colonies over its former range. In the northern Panhandle, we have observed this species at numerous localities on rangelands, but we rarely have seen colonies that numbered more than a few hundred individuals. Some farmers and ranchers now protect small aggregations of prairie dogs on their property, simply guarding against the animals becoming too numerous or widespread.

Specimens examined (25).— DALLAM CO.: 20 mi. [E]NE Texline, 1 (USNM); 10 mi. E Texline, 2; 6 mi. N Conlen, 2 (WTSU); 15 mi. W Stratford, 1 (WTSU). HANSFORD CO.: 2 mi. W Gruver, 1 (KU). HARTLEY CO.: 8 mi. SW Dalhart, 1; 10 mi. E Channing, 7. HEMPHILL CO.: 6 mi. NE Canadian, 1; Gene Howe Wildlife Management Area, 2. HUTCHINSON CO.: 0.5 mi. W Plemons, 1 (UT); North Turkey Creek, Lake Meredith, 1 (WTSU). LIPSCOMB CO.: Lipscomb, 1 (USNM). OCHILTREE CO.: 8 mi. N Perryton, 1 (KU); 7 mi. S, 6 mi. E Perryton, 1; 23 mi. S Perryton, 1 (KU). ROBERTS CO.: Pats Creek, Whitsel Ranch, 1 (TCWC).

Additional records.—HARTLEY CO.: 2 mi. SW Dalhart (UMMZ). HUTCHINSON CO.: mouth Moore Creek (Blair, 1954:244). LIPSCOMB CO.: Higgins (MVZ). MOORE CO.: 4 mi. W Dumas (UMMZ).

Sciurus niger rufiventer É. Geoffroy St.-Hilaire, 1803

Fox Squirrel

Fox squirrels occur in deciduous riparian vegetation, mostly cottonwoods, along the Canadian and its major tributaries, and also along tributaries of the North Canadian River (in Hansford County, for example). We have observed them on Pitcher Creek in Potter County, on Wolf Creek in Lipscomb and Ochiltree counties, and as far west as Boys Ranch in Oldham County. They are common along the Canadian in Hemphill County. A female from Lake Marvin was lactating on 25 May.



FIG. 15.—Distribution of two species of pocket gophers in northern Texas Panhandle. Solid symbols represent *Geomys bursarius*, open symbols represent *Cratogeomys castanops*, half-solid symbols indicate localities where both species have been taken.

Specimens examined (13).—HANSFORD CO.: 3 mi. S, 6 mi. W Gruver, 6 (3 KU); 10 mi. S, 3 mi. W Gruver, 3. HEMPHILL CO.: 3 mi. E Canadian, 2; Lake Marvin, 1.5 mi. N, 13 mi. E Canadian, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 1 (UT).

Geomys bursarius Plains Pocket Gopher

This gopher occurs throughout the Trans-Canadian region of Texas and is a common, sometimes abundant, inhabitant of sandy and other relatively loose soils. We have records from every county north of the Canadian except Hansford and Sherman (Fig. 15). It is found parapatrically with the larger *Cratogeomys castanops*, sometimes in close proximity but never in our experience at the same place. Pregnant females were collected on 18 March (two fetuses, 23 in crown-rump length), 31 March (two, 22), 1 April (five, 13), and 18 May (eight, 22). Testes of adult males measured 15 (April), 9-20 (May), 12, 14 (November), and 16 (December) in length.

Two nominal subspecies have been recorded from the northern Panhandle, *Geomys bursarius jugossicularis* (type locality, Lamar, Powers Co., Colorado) in the extreme northwest and *G. b. major* (type locality, 8 mi. W Clarendon, Donley Co., Texas) elsewhere. These differ mainly in color, *jugossicularis* resembling topotypes of that race in being somewhat paler, more sandy colored than the darker *major* (representative external and cranial

measurements are given in Table 2). Additional material is needed, particularly from Dallam and Hartley counties, to delineate the distribution of *jugossicularis* in northwestern Texas, whence it first was reported by Hall and Kelson (1952:364).

Geomys bursarius jugossicularis Hooper, 1940

Specimens examined (19).—DALLAM CO.: 12 mi. E Texline, 4; 5 mi. E Perico, 4 (TCWC); 1 mi. N, 3 mi. W Dalhart, 2; 2.5 mi. E Dalhart, 1 (TCWC). HARTLEY CO.: 1 mi. S Dalhart, 6; Rita Blanca Dam, 3 mi. S Dalhart, 1; 6 mi. W Channing, 1.

Additional records.—DALLAM CO.: 15 mi. E Texline (Hall and Kelson, 1952:364).

Geomys bursarius major Davis, 1940

Specimens examined (71).—HEMPHILL CO.: 7 mi. N Canadian, 1 (TCWC); Lake Marvin, 1.5 mi. N, 13 mi. E Canadian, 2; Gene Howe Wildlife Management Area, 2; Canadian, 5 (USNM); 5 mi. E Canadian, 1 (TCWC); 12 mi. E Canadian, 1; 18 mi. E Canadian, 1 (TCWC). HUTCHINSON CO.: 2 mi. W Stinnett, 1 (WTSU); 9 mi. E Stinnett, 21 (UT); Bugbee Canyon, Lake Meredith, 1 (WTSU); dam, Lake Meredith, 1 (WTSU). LIPSCOMB CO.: 2 mi. NNW Lipscomb, 3 (MWSU); 3.2 km. NNW Lipscomb, 2 (MWSU); 2 mi. N, 8 mi. E Lipscomb, 2; 1 mi. N, 1 mi. W Lipscomb, 1 (MWSU); Lipscomb, 4 (USNM); 9 mi. E Lipscomb, 1; 8 mi. NW Higgins, 1. MOORE CO.: 3 mi. S Dumas, 4. OCHILTREE CO.: 25 mi. SE Perryton, 1 (TCWC). OLDHAM CO.: Tascosa, 5 (USNM). POTTER CO.: 20 mi. N Amarillo, 5. ROBERTS CO.: 13 mi. S, 11 mi. E Spearman, 2; 15 mi. S, 11 mi. E Spearman, 1; 16 mi. S, 11 mi. E Spearman, 2.

Cratogeomys castanops perplanus Nelson and Goldman, 1934
Yellow-faced Pocket Gopher

This pocket gopher is a widespread resident of the northern Texas Panhandle, having been recorded from north of the Canadian in all counties except Hemphill, Hutchinson, and Roberts (Fig. 15). Its distribution is parapatric with that of the plains pocket gopher, with *C. castanops* occupying somewhat harder, even slightly rocky, soils than the former. At a few places, however, such as 3 mi. S Dumas, where we took the two species within a fifth of a mile of each other along a highway right-of-way, and 12 mi. E Texline, where the two were trapped 50 yards apart, they appeared to occur in similar soil types. Burrows of the two gophers usually can be distinguished in that those of *Cratogeomys* are larger, frequently big enough around to insert one's arm. Our only reproductive data for females are of two lactating, taken on 19 May and 15 July, and one pregnant with three fetuses that was trapped on 4 June. Seasonal molt was noted on specimens collected in January, May, July, and November.

Following Hall (1981), we provisionally refer all yellow-faced pocket gophers from the northern Panhandle to the subspecies *C.*

TABLE 2.—External and cranial measurements of adult females of two subspecies of *Geomys bursarius* from the northern Texas Panhandle. Sample sizes in parentheses following localities.

Statistics	Total length	Length of tail	Length of hind foot	Greatest length of skull	Basilar length	Zygomate breadth	Mastoid breadth	Breadth of rostrum	Length of nasals	Least interorbital constriction	Length of max toothrow
<i>Geomys bursarius jugossicularis</i> , Dallam and Hartley counties (10)											
Ave.	237.2	69.3	30.7	42.36	35.11	25.51	21.70	9.73	13.91	6.15	8.72
Min.	230	59	29	41.09	34.31	24.23	23.67	9.21	13.48	5.72	8.27
Max.	246	78	32	43.89	36.49	26.03	25.58	10.31	14.48	6.64	9.24
<i>Geomys bursarius major</i> , Lipscomb, Moore, Potter and Roberts counties (8)											
Ave.	229.1	66.6	29.1	41.71	35.04	24.87	23.48	9.91	14.52	6.19	9.03
Min.	213	61	26	40.60	34.06	23.75	22.47	9.41	13.35	5.78	8.56
Max.	244	71	32	42.92	35.97	25.53	24.37	10.69	16.16	6.83	9.80

c. perplanus, pending completion of the systematic revision currently underway of United States populations of the species by one of us (Hollander).

Specimens examined (39).—DALLAM CO.: 12 mi. E Texline, 1; 1.7 mi. S, 0.3 mi. W Texline, 1 (NMSU); 2.4 mi. S, 0.3 mi. W Texline, 2 (NMSU). HANSFORD CO.: 5 mi. SW Gruver, 2 (MWSU); 6 mi. S, 3 mi. W Gruver, 1 (KU); 11 mi. SSW Gruver, 1 (MWSU). HARTLEY CO.: 4 mi. N, 9 mi. W Channing, 1. LIPSCOMB CO.: 5 mi. S Booker, 1 (WTSU). MOORE CO.: 3 mi. S Dumas, 2; Blue West Rec. Area, Lake Meredith, 1 (WTSU). OCHILTREE CO.: 11 mi. S, 1 mi. E Perryton, 1; 12 mi. S, 9 mi. E Perryton, 9. OLDHAM CO.: 17 mi. N, 1 mi. W Adrian, 1; 3 mi. W Boys Ranch, 1; Tascosa, 3000 ft., 1 (USNM). POTTER CO.: Plum Creek Rec. Area, Lake Meredith, 2 (WTSU); Saddle Horse Canyon, Lake Meredith 1 (WTSU). SHERMAN CO.: Stratford, 3; 8 mi. S, 2 mi. E Stratford, 1.

Additional records.—HANSFORD CO.: Palo Duro Canyon (Russell, 1968:653). HEMPHILL CO.: no specific locality (Davis, 1974:171), a questionable report.

Perognathus flavescens copei Rhoads, 1894

Plains Pocket Mouse

The plains pocket mouse evidently has a patchy distribution in the northern Texas Panhandle, occurring almost exclusively on sandy and sandy-loam soils in habitats frequently dominated by *Artemisia*. Only locally is it one of the commonly taken small mammals. In Hutchinson County, Blair (1954) captured specimens of this species in deep sand in the floodplain of Bugby Creek and on sandy dunes. Specimens from Hemphill County also were collected in traps set on sandy substrate. Reed and Choate (1986) recently reviewed the systematics of *P. flavescens*.

assigning all specimens they examined from the Panhandle region to the subspecies *copei*.

Specimens examined (27).—HEMPHILL CO.: Gene Howe Wildlife Management Area, 4; 5 mi. NE Canadian, Gene Howe Wildlife Management Area, 1 (TCWC); 12 mi. E Canadian, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 21 (UT).

Perognathus flavus flavus Baird, 1855

Silky Pocket Mouse

This small heteromyid is widely distributed in Trans-Canadian Texas, but in our experience is nowhere especially common. It seems to prefer relatively hard (as opposed to sandy) soils, frequently in rocky areas and in a variety of vegetative types. Blair (1954:247), for example, captured specimens in Hutchinson County in a "buffalo-grass association above the rimrock [of the Canadian breaks] and on rocky slopes"; only one was taken on the floodplain of Bugby Creek where the related *P. flavescens* was common. Of four adult females collected in Hansford County on 20 May, one carried four fetuses (2 in crown-rump length), whereas the others evinced no reproductive activity. Males had scrotal testes in May and June.

We provisionally assign Panhandle specimens of the silky pocket mouse to *P. f. flavus*. The distinction between that race and *P. f. gilvus*, reported from as far north as Mobeetie, Wheeler County (Wilson, 1973), has not been worked out in detail, and geographic variation in western Texas is deserving of serious study. Furthermore, *gilvus* was regarded for many years as representative of a different species, *P. merriami*. We follow Wilson (1973) in regarding *flavus* and *merriami* as conspecific, but recent studies to the south of the Panhandle, in central Texas, suggest the possibility that the two may, in fact, be recognizable as separate species.

Superficially, the silky pocket mouse resembles the plains pocket mouse, *P. flavescens*, and individuals of the two species frequently are difficult to distinguish on the basis of external characters. *Perognathus flavus* averages slightly smaller than *P. flavescens*, has a more conspicuous postauricular patch, and has a brighter, more salmon-colored buffy hue dorsally and laterally, but these differences are best appreciated in direct comparison of specimens. Cranially, *flavus* is easily identified by its larger bullae and conspicuously narrow (as opposed to straplike) interparietal.

Specimens examined (33).—DALLAM CO.: 1 mi. N, 6 mi. W Dalhart, 1. HANSFORD CO.: Gruver, 1 (KU); 11 mi. SSW Gruver, 9 (MWSU). HARTLEY CO.: 3

mi. S Channing, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 17 (UT). OLDHAM CO.: 17 mi. N, 1 mi. W Adrian, 1; 6 mi. W Boys Ranch, 1; 5 mi. W Boys Ranch, 1. ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 1.

Additional records.—MOORE CO.: no specific locality (Davis, 1974:176).

Chaetodipus hispidus paradoxus (Merriam, 1889)

Hispid Pocket Mouse

This distinctive species is generally distributed over the entire northern Panhandle, but is absent from some localized areas and appears to be nowhere especially common. We have taken specimens most frequently in grassy to brushy vegetation along fencerows and in similar circumstances.

Perognathus flavus, *Onychomys leucogaster*, *Reithrodontomys megalotis* and *R. montanus*, and *Peromyscus leucopus* commonly are taken in the same trapline as *C. hispidus*, as occasionally are *Dipodomys ordii*, *Peromyscus maniculatus*, and *Sigmodon hispidus*.

Little is known about the annual reproductive cycle of this mouse. We trapped a gravid female on 16 July that carried nine fetuses (6 in crown-rump length). The testes of a mature male taken on 9 August measured 17 in length; those of young adult males taken on 15 July, 16 July, and 8 August measured 8, 8, and 9 in length, respectively.

Specimens examined (36).—DALLAM CO.: 10.6 mi. W Stratford, 1; 1 mi. N, 8 mi. W Dalhart, 4; 1 mi. N, 6 mi. W Dalhart, 3. HANSFORD CO.: 6 mi. S, 2 mi. W Gruver, 1 (KU); 8 mi. S Spearman, 4. HEMPHILL CO.: Gene Howe Wildlife Management Area, 1; 6 mi. E Canadian, 1 (TCWC); 12 mi. E Canadian, Lake Marvin, 1. HUTCHINSON CO.: 1 mi. S, 10 mi. E Pringle, 3 (KU); 9 mi. E Stinnett, 4 (UT); 4.8 mi. NW Sanford, 1. LIPSCOMB CO.: Lipscomb, 2 (USNM). MOORE CO.: 4 mi. N, 1 mi. E Dumas, 3; 3 mi. S Dumas, 1; Blue West Rec. Area, Lake Meredith, 1 (WTSU). OCHILTREE CO.: 12 mi. S, 8 mi. E Perryton, 2. Oldham Co.: 17 mi. N, 1 mi. W Adrian, 1; 6 mi. W Boys Ranch, 1. POTTER CO.: Plum Creek Rec. Area, Lake Meredith, 1 (WTSU).

Additional records.—DALLAM CO.: Dalhart (AMNH).

Dipodomys ordii richardsoni (J. A. Allen, 1891)

Ord's Kangaroo Rat

The kangaroo rat is locally common to abundant on sandy soils throughout Trans-Canadian Texas, frequently the most commonly captured rodent in such habitats—sand-sage for example. Where it occurs, individuals frequently are seen along roadways at night; they are easily captured in both live traps and snap traps baited with rolled oats. *Onychomys leucogaster* is one of the species most frequently taken in the same traplines with *D.*

ordii. From the area of Texas lying north of the Canadian, we lack specimens only from Ochiltree County.

Despite the large number of kangaroo rats examined in this study, reproductive data are few. A female taken on 18 March carried five fetuses (16 in crown-rump length); one captured on 11 June was in postlactating condition and had six placental scars; a third obtained on 15 November was lactating. Adult males with scrotal testes (measurements in parentheses) have been taken in January (9-12), April (9), May (8-15), July (15), August (12), October (14), and November (10). Molting adults have been collected in all seasons of the year.

We follow Setzer (1949:511-514) and others in referring specimens from the northern Panhandle to *D. o. richardsoni*. The southern limits of distribution of that race are poorly documented, however, and the Canadian River and its breaks could provide an area where gene flow is, in part at least, discontinuous between populations distributed to the north and south. Setzer (1949:511-514) did, nevertheless, assign a few specimens from south of the Canadian to *richardsoni* (see also Schmidly, 1971, and Baumgardner and Schmidly, 1981).

Specimens examined (475).—DALLAM CO.: 2 mi. N, 13 mi. E Texline, 1; Texline, 5 (USNM); 12 mi. E Texline, 11; 15 mi. E Texline, 3 (USNM); 21 mi. N Dalhart, 1 (MWSU); 15 mi. W Stratford, 1 (WTSU); 10.6 mi. W Stratford, 1; 1 mi. N, 6 mi. W Dalhart, 1. HANSFORD CO.: 13 mi. N Gruver, 1; 2 mi. N, 11 mi. W Gruver, 3300 ft., 25 (KU); 6 mi. S, 2 mi. W Gruver, 4 (KU); 10 mi. N Spearman 3 (WTSU). HARTLEY CO.: 1-2 mi. SW Dalhart, 4000 ft., 4 (TCWC); 11 mi. W Channing 3; 1.5 mi. S, 6 mi. W Channing, 1; 3 mi. S Channing, 9; 15 mi. W Dumas, 1 (WTSU). HEMPHILL CO.: 14 mi. NE Canadian, 4 (WTSU); 10 mi. NW Canadian, 2 (WTSU); 5-10 mi. NE Canadian, Gene Howe Wildlife Management Area, 12 (7 TCWC, 5 WTSU); 7 mi. N Canadian, 11; 6-7 mi. ENE Canadian, 2 (TCWC); Gene Howe Wildlife Management Area, 92; 1.5 mi. N, 13 mi. E Canadian, 1; Canadian, 6 (USNM); 10 mi. E Canadian, 5 (MWSU); 12 mi. E Canadian, Lake Marvin, 7. HUTCHINSON CO.: 1 mi. S, 10 mi. E Pringle, 3400 ft., 2 (KU); 2 mi. S, 11 mi. E Pringle, 3 (KU); 4 mi. S, 11 mi. E Pringle, 7 (KU); 5 mi. S, 10 mi. E Pringle, 3400 ft., 29 (KU); 9 mi. E Stinnet, 105 (UT); 4.8 mi. NW Sanford, 1; 4 mi. NW Sanford, 7; 3.5 mi. NW Sanford, 3; Spring Canyon, Lake Meredith, 5 (WTSU). LIPSCOMB CO.: 1 mi. N, 5 mi. E Follett, 5 (WTSU); 2 mi. N, 8 mi. E Lipscomb, 2; 2 mi. (3.2 km.) NNW Lipscomb, 22 (MWSU); 2 mi. NW Lipscomb, 1 (MWSU); 1 mi. N, 1 mi. W Lipscomb, 1 (MWSU); Lipscomb, 3 (USNM). MOORE CO.: 3 mi. S Dumas, 3; 14 mi. E, 7 mi. S Dumas, 3300 ft., 1; Blue West Rec. Area, Lake Meredith, 1 (WTSU). OLDHAM CO.: 17 mi. N, 1 mi. W Adrian, 1; 6 mi. W Boys Ranch, 6; Tascosa, 7 (USNM). POTTER CO.: 18 mi. N Amarillo, 3500 ft., 1 (TCWC); Canadian River, 2 mi. W Lake Meredith, 2700 ft., 3 (TCWC); Plum Creek Rec. Area, 15 (WTSU); Saddle Horse Canyon, Lake Meredith, 1 (WTSU). ROBERTS CO.: 13 mi. S, 11 mi. E Spearman, 9; 15 mi. S, 11 mi. E Spearman, 9; 16 mi. S, 11 mi. E Spearman, 1. SHERMAN CO.: 10 mi. N Stratford, 2; 10 mi. S Stratford, 2 (KU).

Additional records.—DALLAM CO.: Dalhart (AMNH). HEMPHILL CO.: 17 mi. NE Canadian (Setzer, 1949:514).

Castor canadensis missouriensis V. Bailey, 1919

Beaver

The beaver is relatively common along the Canadian River and its larger tributaries in the Panhandle, and occurs also on Wolf Creek and Palo Duro Creek, a tributary of the North Canadian, for example. Layne Allen, a trapper in Perryton, Texas, has taken these animals for their pelts in each of the past several winters and has provided us with skulls (see specimens examined) of some of them. That a harvestable population resides in suitable habitat in the region bodes well for the future of this species.

Following Hall (1981), we provisionally assign northern Panhandle material to *C. c. missouriensis*, although the subspecies *C. c. texensis* Bailey, 1905 (type locality Cummings Creek, Colorado Co., Texas), tentatively was reported (Bailey, 1905:122) from the "Wichita and Canadian rivers not far from Canadian." Southwestern populations of the species are in need of critical systematic review.

Specimens examined (6).—HANSFORD CO.: Palo Duro Creek, NE part of county, 1. OCHILTREE CO.: Palo Duro Creek, NW part of county, 3. ROBERTS CO.: Canadian River, 17 mi. S, 12 mi. E Spearman, 2.

Additional records (Hollander *et al.*, 1987, unless otherwise noted).—HANSFORD CO.: 3 mi. S, 6 mi. W Gruver (W. L. Cutter, field notes, 1957). HUTCHINSON CO.: below dam, Lake Meredith. OLDHAM CO.: Romero Creek, 17 mi. N, 1 mi. W Adrian. POTTER CO.: Pitcher Creek, 16 mi. N Amarillo.

Reithrodontomys megalotis aztecus J. A. Allen, 1893

Western Harvest Mouse

This species is a widespread but relatively uncommon inhabitant of the northern Panhandle region except under favorable local conditions. It seems to prefer brushy fencerows and overgrown grassy areas, which are not among the most abundant of Panhandle habitats. Our largest series (22 mice) was taken in mid- and late July along a grassy fencerow in Hansford County that separated a farm-to-market road from a field in which winter wheat was grown; wild oats and western wheat grass predominated at this trap site. Another series was taken in mid-January in dense grassy-weedy cover, with a heavy growth of Russian thistle, along a railroad right-of-way southeast of Stratford.

Females taken on 21 May and 11 June carried two and three fetuses, respectively, that measured 11 and 9 in crown-rump lengths, whereas three trapped on 30 and 31 July were gravid with four, five, and five fetuses (12, 2, and 16 in lengths); January-taken females evinced no reproductive activity. Males had testes that measured 3-6 in mid-January, 11 on 21 May, 7-9 in early June, 9 and 9 on 15 July, 7-9 in late July, and 4-8 in early November. Two specimens in the series from Sherman County still were completing, on the posterior dorsum, the last vestiges of autumnal molt, as was a male in the series from Hansford County with respect to vernal molt.

Average external measurements (extremes in parentheses) of 19 adults (seven males, 12 females) from Sherman County are: total length, 130.2 (116-144); length of tail, 58.9 (50-67); length of hind foot, 16.5 (15-18); length of ear, 13.5 (11-15); weight, 10.8 (8.0-13.2); percentage tail of head and body, 82.8 (74.7-94.3). Cranial measurements are given in Table 3. We tentatively follow Jones and Mursaloğlu (1961) in referring Panhandle material to *R. m. aztecus*. However, only three Panhandle specimens were available to them, and mice now at hand have dimensions that resemble those of *R. m. dychei* to a greater degree than they resemble measurements of *aztecus*, particularly in the shorter skull and rostrum and smaller percentage of tail length to that of head and body. A systematic review of western harvest mice of the Panhandle and adjacent regions is needed.

Specimens examined (54).—DALLAM CO.: 12 mi. E Texline, 2. HANSFORD CO.: 10 mi. S, 1 mi. W Gruver, 2 (KU); 8 mi. S Spearman, 22. HARTLEY CO.: 3 mi. S Channing, 2. HUTCHINSON CO.: 9 mi. E Stinnett, 1 (UT). LIPSCOMB CO.: 2 mi. NW Lipscomb, 1 (MWSU). MOORE CO.: 4 mi. N, 1 mi. E Dumas, 2; 3 mi. S Dumas, 1. SHERMAN CO.: 10 mi. N Stratford, 3; 8 mi. S, 2 mi. E Stratford, 18.

Reithrodontomys montanus griseus V. Bailey, 1905

Plains Harvest Mouse

Like its larger relative, the plains harvest mouse is widely distributed in the Trans-Canadian region, but appears to be nowhere especially common. It seems to prefer more xeric, upland areas with sparser and shorter vegetation than does *R. megalotis*. We have, however, occasionally taken the two at the same locality, such as in the vicinity of Stratford, but *R. montanus* usually occupied local areas with less ground cover.

A female taken on 17 May carried three fetuses that were 9 in crown-rump length; one trapped on 5 July had three fetuses; of two collected on 8 August, one contained three fetuses (crown-

TABLE 3.—Comparative cranial measurements of adults of two species of *Reithrodontomys* from the northern Panhandle of Texas. Sample sizes in parentheses; superscript numbers indicate fewer specimens than sample size.

Statistics	Greatest length of skull	Zygomatic breadth	Breadth of braincase	Postorbital constriction	Depth of cranium	Length of rostrum	Breadth of rostrum	Length of max. toothrow
<i>Reithrodontomys megalotis aztecus</i> , Sherman County (19)								
Ave. (7♂, 12♀)	20.62	10.65	10.08	3.17	7.82	7.15	3.50	3.30
Min.	19.83	10.30	9.62	3.03	7.60	6.80	3.22	3.03
Max.	21.23	11.30	10.44	3.44	8.09	7.69	3.88	3.53
<i>Reithrodontomys montanus griseus</i> , various Panhandle localities (15)								
Ave. (7♂, 8♀)	19.71 ¹⁴	10.41	9.49	3.01	7.48	6.77 ¹⁴	3.58 ¹⁴	3.30
Min.	19.14	9.81	9.19	2.88	7.23	6.41	3.35	3.16
Max.	20.25	10.85	9.77	3.15	7.87	6.99	3.78	3.49

rump length, 16) and the other had four (crown-rump length, 9) and was lactating as well; one taken on 14 November was lactating. Nonpregnant animals were caught on 8 August, 15 November, and 14 January. Testes of males had the following measurements: 3 (15 January), 9 (11 June), 6 and two with nonscrotal testes (1 November), 4, 6 (2 November), 2 (14 November), 1 (15 November). A male taken on 11 June still had old winter pelage on the rump and posterior flanks.

Average external measurements (extremes in parentheses) of 21 adults (11 males, 10 females) from the northern Panhandle are: total length, 121.3 (112-132); length of tail, 53.5 (45-62); length of hind foot, 15.6 (14-17); length of ear, 12.9 (12-15); weight of 15 individuals, 8.9 (8.0-13.8). Cranial measurements are given in Table 3.

Specimens examined (26).—DALLAM CO.: 12 mi. E Texline, 2; 1 mi. N, 8 mi. W Dalhart, 3. HANSFORD CO.: 3 mi. S, 6 mi. W Gruver, 2 (KU). HARTLEY CO.: 10 mi. W Channing, 2; 6 mi. W Channing, 2; 3 mi. S Channing, 1. HEMPHILL CO.: Gene Howe Wildlife Management Area, 2. HUTCHINSON CO.: 9 mi. E Sinnen, 1 (UT); 3.5 mi. NW Sanford, 1. MOORE CO.: 3 mi. S Dumas, 5. SHERMAN CO.: 10 mi. N Stratford, 3; 8 mi. S, 2 mi. E Stratford, 2.

Additional records.—HEMPHILL CO.: no specific locality (Benson, 1935:141).

Peromyscus leucopus tornillo Mearns, 1896

White-footed Mouse

Considering both abundance and local distribution, *P. leucopus* is the most ubiquitous of northern Panhandle rodents. A

denizen of deciduous forests and forest edge situations over much of its range in the eastern United States, this mouse is, of course, common along riparian woodlands in the region. It also is found, however, in rocky outcroppings, on juniper-covered rocky slopes, and occasionally in brushy cover and along fencerows where *Yucca* and *Prosopis* prevail. In short, it occurs in most major habitats excepting heavily agriculturized areas and open rangelands. At a place along Bugby Creek, 9 mi. E Stinnett, Blair (1954:250) recorded *P. leucopus* as collected "in cottonwood groves on the floodplain . . . , but some were taken on rocky slopes with scattered woody vegetation, and 3 were taken at the margin of a tule marsh inhabited by cotton rats and muskrats." Thornton and Al-Uthman (1952) reported on movements of this mouse among cottonwood groves along Bugby Creek.

We have records of the white-footed mouse from north of the Canadian in all 12 counties of our study area. Variation in size and color is evident in our large series, but, after that resulting from age and season is accounted for, all specimens seem clearly referable to the subspecies *P. l. tornillo*.

Gravid females (14) were taken in April, May, June, October, and December, and lactating females in April and May. Number of fetuses ranged from two to eight (mode four, average 3.9). One female gave birth to four young in a live trap on 15 April; standard external measurements of one of the neonates were 46, 11, 8, 0, and it weighed 2.0. Juveniles were collected from April through July and in October and November. Testes of adult males ranged in length from 6-12 in January, 9-14 in April, 10-23 in May, 9-19 in June, 10-16 in July, 12-18 in August, 10-13 in October, 6-14 in November, to 9-16 in December.

Two June-taken adults still had old, worn pelage on the posterior part of the dorsum. We examined another adult molting in June and one completing molt in November.

Average external measurements (extremes in parentheses) of 16 adults (10 males, six females) from Oldham and Sherman counties are as follows: total length, 181.3 (170-202); length of tail, 80.8 (70-90); length of hind foot, 22.4 (21-24); length of ear, 17.1 (15-19); weight of 12 individuals, 27.9 (22.9-34.0). *Peromyscus leucopus* averages less buffy in dorsal color and is larger, both externally and cranially (see Table 4), than *P. maniculatus* although there is overlap in the extremes of some measurements. Externally, the hind foot of *leucopus* rarely measures less than 21, whereas that of *maniculatus* usually is 20 or less.

Specimens examined (365).—DALLAM CO.: 2 mi. N, 13 mi. E Texline, 3; 12 mi. E Texline, 6 (3 MWSU); 1 mi. N, 6 mi. W Dalhart, 1. HANSFORD CO.: 2 mi. N, 11 mi. W Gruver, 4 (KU); 2 mi. S, 6 mi. W Gruver, 10 (KU); 7.5 mi. SE Gruver, 2 (KU). HARTLEY CO.: 1 mi. S Dalhart, 1; 3 mi. S Dalhart, Rita Blanca Dam, 1; 1 mi. N, 8-10 mi. W Channing, 18; 1 mi. N, 1 mi. W Channing, 1; 6 mi. W Channing, 3; 1.5 mi. S, 6 mi. W Channing, 1; 3 mi. S Channing, 5. HEMPHILL CO.: Canadian, 5 (4 USNM); 5.5-10 mi. NE Canadian, 9 (TCWC); Gene Howe Wildlife Management Area, 10; 6 mi. ENE Canadian, 3 (TCWC); Shelton Ranch, 6 mi. E Canadian, 1; Lake Marvin, 1.5 mi. N, 13 mi. E Canadian, 12; Lake Marvin, 1 mi. N, 12 mi. E Canadian, 15 (KU); Lake Marvin, 12 mi. E Canadian, 32. HUTCHINSON CO.: 18 mi. S 1 mi. W Spearman, 2 (KU); 1 mi. S, 10 mi. E Pringle, 3400 ft., 4 (KU); 2 mi. S, 11 mi. E Pringle, 1 (KU); 9 mi. E Stinnett, 34 (UT); 3.5-1.8 mi. NW Sanford, 25. LIPSCOMB CO.: 1 mi. N, 5-5.5 mi. E Follett, 3 (WTSU); 2 mi. NNW Lipscomb, 1 (MWSU); 2 mi. NW Lipscomb, 1 (MWSU); 2 mi. N, 8 mi. E Lipscomb, 9; Lipscomb, 11 (USNM); 9 mi. E Lipscomb, 4. MOORE CO.: 7 mi. S, 14 mi. E Dumas, 3300 ft., 9; 17.2 mi. NW Sanford, 8; Blue West Rec. Area, Lake Meredith, 2 (WTSU). OCHLTREE CO.: 12 mi. S, 8 mi. E Perryton, 6; 12 mi. S, 9 mi. E Perryton, 2; 23 mi. S Perryton, 1 (WTSU). OLDHAM CO.: 18 mi. N, 1 mi. W Adrian, 8; 17 mi. N, 1 mi. W Adrian, 5; 3-6 mi. W Boys Ranch, 9; 1 mi. S, 5 mi. W Boys Ranch, 6. POTTER CO.: Plum Creek Rec. Area, Lake Meredith, 3 (WTSU); Saddle Horse Canyon, Lake Meredith, 1 (WTSU); 15 mi. N Amarillo, 16. ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 10; 10.5 mi. S, 11 mi. E Spearman, 15; 15 mi. S, 11 mi. E Spearman, 9; 16 mi. S, 11 mi. E Spearman, 3; Killebrew Ranch, NE part of county, 1 (WTSU). SHERMAN CO.: 10 mi. N Stratford, 10; 8 mi. S, 2 mi. E Stratford, 3.

Additional records.—MOORE CO.: 4 mi. W Dumas (UMMZ).

Peromyscus maniculatus luteus Osgood, 1905

Deer Mouse

The deer mouse, while occurring generally throughout Trans-Canadian Texas, is not so common, except in localized situations, as its larger congener, *P. leucopus*, nor so broadly distributed ecologically. This is a mouse of upland situations. Occasionally, in brushy fencerows and the like, the two species of *Peromyscus* have been taken in the same trapline. Aside from the series from Hansford, Moore, and Sherman counties listed below, we found *P. maniculatus* nowhere especially numerous. Blair (1954) took a specimen in stable sand dunes along Bugby Creek in Hutchinson County and another in the creek floodplain.

Following Judd (1970), we refer our Panhandle material to *P. m. luteus*, which he interpreted as occurring over the entire Llano Estacado. Many of our specimens resemble *luteus* (type locality, Kennedy, Cherry Co., Nebraska) in having pale, yellowish buff to buffy brown dorsal coloration, but some are darker. On the average, they are larger, both externally and cranially, than mice from the vicinity of the type locality (see

TABLE 4.—Comparative cranial measurements of adults of two species of *Peromyscus* from the northern Texas Panhandle. Sample sizes in parentheses; superscript numbers indicate fewer specimens than sample size.

Statistics	Greatest length of skull	Zygomatic breadth	Breadth of braincase	Postorbital constriction	Depth of cranium	Length of rostrum	Breadth of rostrum	Length of max. toothrow
<i>Peromyscus leucopus tornillo</i> , Oldham and Sherman counties (16)								
Ave. (10♂, 6♀)	27.91	14.53	12.43	4.37	9.77	10.76	5.01	4.09
Min.	26.96	13.63	12.17	4.06	9.15	10.34	4.61	3.92
Max.	30.12	15.32	13.02	4.65	10.10	11.51	5.21	4.36
<i>Peromyscus maniculatus luteus</i> , Sherman County (20)								
Ave. (10♂, 10♀)	24.78 ¹⁹	12.86	11.03	3.90	8.71	9.42 ¹⁹	4.54	3.83
Min.	23.90	12.19	10.52	3.71	8.25	9.05	4.22	3.42
Max.	25.97	13.91	11.41	4.29	9.31	10.10	4.92	4.28

Jones, 1964). Features of specimens from the Panhandle may reflect intergradation with one or more subspecies occurring to the west, south, and southeast, as suggested by Judd. Critical study of the now more abundant material than was available to him is warranted. One specimen from a series trapped northeast of Dumas had a strong buffy wash covering the entire venter and legs, quite unlike the venter of white-tipped hairs in typical specimens from the same series; another adult had an unusual pale grayish dorsal pelage.

Pregnant females were collected in January (one), July (11), October (one), and November (nine); fetuses averaged 4.6 per pregnancy (mode four, range three to seven). Testes of adult males measured 7-16 in January, 9 in April, 12 in May, 7-14 in July, 10 in September, and 8-13 in November. We took juvenile mice in May, July, and November. One of four young born in a live trap on 31 July measured 37 in total length and weighed 1.8.

External measurements of 20 adults (10 males, 10 females) from Sherman County average (extremes in parentheses): total length, 148.2 (137-162); length of tail, 56.9 (49-64); length of hind foot, 19.0 (18-20); length of ear, 15.4 (14-18); weight (19 specimens only), 21.8 (17.5-27.0). Cranial measurements are given in Table 4.

Specimens examined (221).—DALLAM CO.: 12 mi. E Texline, 14. HANSFORD CO.: 2 mi. N, 11 mi. W Gruver, 5 (KU); 6 mi. S, 2 mi. W Gruver, 4 (KU); 11 mi. SSW Gruver, 4 (MWSU); 8 mi. S Spearman, 67. HARTLEY CO.: 1 mi. SW Dalhart, 1 (TCWC); 3 mi. SW Dalhart, 4000 ft., 2 (TCWC); 3 mi. S Dalhart, 3; 7 mi. SE

Dalhart, 3; 3 mi. S Channing, 1. HEMPHILL CO.: 5 mi. NE Canadian, 5 (TCWC); 10 mi. NE Canadian, 1 (TCWC); Gene Howe Wildlife Management Area, 8; Lake Marvin, 12 mi. E Canadian, 1. HUTCHINSON CO.: 5 mi. S, 10 mi. E Pringle, 3400 ft., 1 (KU); 6 mi. N, 6 mi. W Stinnett, 1; 6 mi. N Stinnett, 5 (WTSU); 9 mi. E Stinnett, 2 (UT); 4.8 mi. NW Sanford, 2. LIPSCOMB CO.: 3.5 mi. NW Dartonzett, 1 (WTSU); 2 mi. NNW Lipscomb, 4 (MWSU); 2 mi. NW Lipscomb, 1 (MWSU); 2 mi. N, 8 mi. E Lipscomb, 2; 12 km. NW Higgins, 1 (MWSU); 4 km. SSE Higgins, 1 (MWSU). MOORE CO.: 4 mi. N, 1 mi. E Dumas, 27; 3 mi. S Dumas, 1; 2 mi. N Masterson, 3700 ft., 1. OCHILTREE CO.: 7 mi. N Perryton, 6; 1 mi. N Farnsworth, 4 (WTSU); 12 mi. S, 9 mi. E Perryton, 2; no specific locality, 1 (WTSU). POTTER CO.: Plum Creek Rec. Area, Lake Meredith, 2 (WTSU). SHERMAN CO.: 10 mi. N Stratford, 16; 2 mi. N Stratford, 2 (MWSU); 8 mi. S, 2 mi. E Stratford, 16.

Onychomys leucogaster arcticeps Rhoads, 1898

Northern Grasshopper Mouse

This cricetine is a widespread species in the northern Panhandle, common to abundant in some places. We have records from all Trans-Canadian counties except Ochiltree. This mouse is an obligate dust-bather, and thus inhabits local areas where there are some bare dusty or sandy patches suitable for this activity. These are primarily in uplands; thus, *O. leucogaster* commonly is taken along grassy-weedy fencerows and similar habitats in, or adjacent to, rangeland, especially on sandy soil. *Dipodomys ordii* and *Reithrodontomys montanus* are frequent associates. Engstrom and Choate (1979) included several samples from the Texas Panhandle in their study of variation in *O. leucogaster* on the central Great Plains.

Despite the relatively large number of specimens examined, we have little reproductive data for this species. Pregnant females were obtained on 19 May and 8 August (five and four fetuses with crown-rump lengths of 17 and 15, respectively); lactating females were trapped on 5 June, 19 July, and 9 August. Adult males had testes ranging in length from 20-30 in May, 20-26 (June), 14-20 (July), 6-21 (August), to 2-8 (November). Juveniles were taken in most of the warm months. Annual molt was evident on adults trapped in May, July, and October.

Specimens examined (212).—DALLAM CO.: 2 mi. N, 13 mi. E Texline, 1; Texline, 11 (USNM); 12 mi. E Texline, 3 (1 MWSU); 1 mi. N, 8 mi. W Dalhart, 14. HANSFORD CO.: 2 mi. N, 11 mi. W Gruver, 3300 ft., 15 (KU); 6 mi. S, 2 mi. W Gruver, 3 (KU); 11 mi. SSW Gruver, 1 (MWSU). HARTLEY CO.: 1 mi. SW Dalhart, 3 (TCWC); 7 mi. SE Dalhart, 1; 1 mi. N, 8-10 mi. W Channing, 6; 6 mi. W Channing, 5. HEMPHILL CO.: Gene Howe Wildlife Management Area, 5-9 mi. NE Canadian, 7 (6 TCWC); 6 mi. ENE Canadian, 1 (TCWC); 10 mi. E Canadian, 1 (MWSU); Lake Marvin, 1.5 mi. N, 13 mi. E Canadian, 5; Lake Marvin, 12 mi. E Canadian, 10. HUTCHINSON CO.: 1 mi. S, 10 mi. E Pringle, 3400 ft., 1 (KU); 2 mi.

S, 11 mi. E Pringle, 4 (KU); 4 mi. S, 13 mi. E Pringle, 5 (KU); 9 mi. E Stinnett, 11 (UT); 4.8 mi. NW Sanford, 1; 3.5 mi. NW Sanford, 4. LIPSCOMB CO.: 12 km. NW Lipscomb, 6 (MWSU); 2 mi. N, 8 mi. E Lipscomb, 1; 2 mi. (3.2 km.) NNW Lipscomb, 8 (MWSU); 2 mi. NW Lipscomb, 2 (MWSU); Lipscomb, 12 (USNM). MOORE CO.: 4 mi. N, 1 mi. E Dumas, 3; 4 mi. W Dumas, 2; 3 mi. S Dumas, 14; 2 mi. N Masterson, 3700 ft., 1; 17.2 mi. NW Sanford, 2. OLDHAM CO.: 17 mi. N, 1 mi. W Adrian, 1; 3-6 mi. W Boys Ranch, 7. POTTER CO.: 18 mi. N Amarillo, 3500 ft., 1 (TCWC). ROBERTS CO.: 10 mi. S, 15 mi. E Spearman, 1; 13 mi. S, 11 mi. E Spearman, 1. SHERMAN CO.: 2 mi. N Stratford, 3 (MWSU); 8 mi. S, 2 mi. E Stratford, 1.

Additional records.—DALLAM CO.: Dalhart (AMNH). HARTLEY CO.; Bravo (not located) (KU). HEMPHILL CO.: 17 mi. NE Canadian (MVZ).

Sigmodon hispidus texianus (Audubon and Bachman, 1853)

Hispid Cotton Rat

The cotton rat occurs throughout the northern Texas Panhandle but is absent locally from dry upland and rocky habitats. It is most common in riparian situations in the eastern counties of the region. This species has dispersed northward dramatically within historic times and quite possibly is a relatively recent member of the Trans-Canadian fauna, although no direct data are available on that point. It was not taken, however, by personnel of the U.S. Biological Surveys when they collected mammals in Dallam, Hemphill, Lipscomb, and Oldham counties around the turn of the last century.

Cotton rats from the northern part of the Panhandle have been referred to in the literature as one or another of the subspecies *S. h. berlandieri* or *S. h. texianus*, apparently solely on geographic grounds. Because our material resembles *texianus* in color, and because invasion of the region probably was from the east (along river systems) rather than from the south (across the Llano Estacado), we tentatively refer our specimens to that subspecies pending an in-depth review of variation in *S. hispidus*.

Reproduction in the hispid cotton rat evidently takes place in all but the coldest months of the year. Fourteen gravid females trapped in May, June, July, and November carried an average of 7.4 fetuses, range four to 13. Mature males had testes measuring 25-27 in June, 23-35 in July, and 22-25 in early November.

One female gave birth to three young in a live trap on 5 June and another bore five in a trap on 31 July. Standard external measurements of one of the latter neonates were 67, 16, 7, 3, weight 4.8. On 30 July, three active and possibly weaned young were found in a nest the size of a soft ball that was constructed of dried grasses beneath a discarded, heavy paper bag. Total length

of these young measured 81-83. Other juveniles were taken in March, June, July, and November.

Specimens examined (80).—DALLAM CO.: 12 mi. E Texline, 1. HANSFORD CO.: 6 mi. S, 2 mi. E Gruver, 2 (KU); 8 mi. S Spearman, 19. HARTLEY CO.: 1.5 mi. S, 6 mi. W Channing, 1. HEMPHILL CO.: Gene Howe Wildlife Management Area, 3; Shelton Ranch, 6 mi. E Canadian, 2. HUTCHINSON CO.: 6 mi. N Stinnett, 1 (WTSU); 9 mi. E Stinnett, 4 (UT); Spring Canyon, Lake Meredith, 3 (WTSU); 4.8 mi. NW Sanford, 18; 3.5 mi. NW Sanford, 1. LIPSCOMB CO.: 1 mi. N, 5 mi. E Follet, 5 (WTSU); 9 mi. E Lipscomb, 1. MOORE CO.: 4 mi. N, 2 mi. E Dumas, 15. OCHILTREE CO.: 12 mi. S, 8 mi. E Pettyton, 1. SHERMAN CO.: 8 mi. S, 2 mi. E Stratford, 3.

Additional records.—DALLAM CO.: Dalhart (AMNH). HEMPHILL CO.: 10 mi. NE Canadian (MVZ); 2 mi. N Canadian (MVZ); 6 mi. E Canadian, (UMMZ).

Neotoma albigula warreni Merriam, 1908

White-throated Woodrat

This species is a denizen of rocky outcroppings and slopes in Trans-Canadian Texas. Thus, its distribution is limited to the Canadian breaks, lesser outcroppings along other drainage systems, and the few other places in the Panhandle where rocky habitats prevail. *Neotoma albigula* appears to be most common in areas of rock where juniper abounds, such as in northwestern Roberts County, where yucca, mountain mahogany, and skunk-brush sumac also are prominent plant species. Cutter (1959c:449) took specimens in Hansford and Hutchinson counties "only on rocky slopes and arroyos." We found nests of this species among and under large rocks and in one instance at the base of a juniper tree adjacent to an outcropping.

In our experience, when *N. albigula* was present it was the only woodrat taken in saxicolous habitats. In the absence of *albigula*, the southern plains woodrat (*N. micropus*) frequently occupied rocky areas. Cutter (1959c:449), however, noted that there seemingly was "no ecological separation of the two species," when taken at the same locality in areas where he collected.

Two gravid females obtained on 16 May each carried two fetuses (6 and 43 in crown-rump lengths). A postlactating female was trapped on 15 April, and two juveniles were taken on 5 June. Adult males had the following testicular lengths: 19 (April), 27 (May), 17, 18 (June), and 12 (August). A male taken on 27 June was molting on small areas of the dorsum. Ten adults (three males, seven females) had the following average (extremes in parentheses) measurements: total length, 324.8 (295-357); length of tail, 137.0 (119-154); length of hind foot, 34.8 (32-37.5); length

TABLE 5.—Comparative cranial measurements of adults of two species of *Neotoma* from the northern Texas Panhandle. Superscript numbers indicate fewer specimens than sample size.

Catalog no. or specimens averaged, and sex	Greatest length of skull	Zygomatic breadth	Mastoid breadth	Postorbital constriction	Length of rostrum	Breadth of rostrum	Length of palatal bridge	Length of max. toothrow
<i>Neotoma albigula warreni</i>								
TTU 6851, ♂	49.26	26.20	20.51	5.77	18.79	8.69	7.88	9.06
TTU 6852, ♂	48.69	26.85	19.72	6.18	19.20	8.35	8.53	9.46
TTU 52004, ♂	46.20	23.93	18.69	6.01	17.38	8.26	8.63	9.32
TTU 51825, ♂	44.86	23.97	18.31	5.78	17.05	7.42	8.07	7.70
Ave. 7♀	44.43	23.95	18.29	5.80	16.56	7.75	8.35	9.06
Min.	47.26	23.02	17.75	5.38	15.85	7.27	7.98	8.24
Max.	42.65	25.40	18.94	6.14	18.10	8.18	8.72	9.62
<i>Neotoma micropus canescens</i>								
TTU 917, ♂	51.55	27.68	—	7.06	20.66	8.95	7.85	8.97
TTU 47243, ♂	47.15	26.26	19.39	6.67	17.19	7.62	6.82	9.07
TTU 47246, ♂	50.70	27.03	19.82	6.25	20.10	8.32	8.01	9.36
Ave. 9♀	48.57	26.12	18.87 ⁸	6.30	18.80	7.87	8.21 ⁸	9.49
Min.	46.15	24.65	17.95	5.90	17.89	7.29	7.43	8.90
Max.	50.91	27.62	20.24	6.83	19.82	8.73	8.84	9.93

of ear, 28.6 (25-31). A male and four females weighed 162, 170, 182, 195, and 199, respectively. Cranial measurements for some specimens are given in Table 5.

Some authors have reported difficulty in distinguishing *N. albigula* from *N. micropus* at places where their distributions overlap, and hybridization between the two has been documented (see Rogers and Schmidly, 1981:180). The latter authors noted that the "possibility exists that *N. a. warreni* represents hybrids between *N. albigula* and *N. micropus*," although they reported several characters as "reliable in distinguishing *albigula* from *micropus* in Texas." We concur with the last statement as we experienced little difficulty in identifying *albigula* on the basis of a suite of characters from which it differs on average from *micropus*.

Of the characters analyzed, we found the following of *albigula* most useful: dorsum buffy gray rather than pale grayish (the occasional *micropus* that approaches *albigula* in color lacks the intensity of buff on the cheeks and lateral line); venter with hairs completely white to base or (in one individual) pale grayish at

base (mid-lateroventral hairs are conspicuously dark gray at the base in most *micropus* from the northern Panhandle); skull flattened; foramen magnum rounded rather than ovoid; sphenopalatine vacuities narrow (occasionally so in *micropus*); maxillovomerine notch present (usually absent in *micropus*), with perforation in septum dorsoposterior to it; posterior palatal spine absent (usually present in *micropus*). Another characteristic involves the hyoid arch. In *albigula*, the basihyal has a relatively small, knoblike medial projection (prominent in *micropus*) and the thyrohyals are broad and flattened (slender in *micropus*). In addition, *N. albigula* averages smaller, both externally and cranially, than *N. micropus*, and the cheekteeth are less robust.

We follow Rogers and Schmidly (1981) in assigning white-throated woodrats from north of the Canadian River to the subspecies *N. a. warreni*, which occurs also in southeastern Colorado, northeastern New Mexico, and the Oklahoma Panhandle. The Canadian may well be the break between *N. a. warreni* and *N. a. albigula* to the south on the caprock along the eastern edge of the Llano Estacado.

Specimens examined (27).—HUTCHINSON CO.: 1 mi. S, 10 mi. E Pringle, 5 (KU); 2 mi. S, 11 mi. E Pringle, 5 (KU); 4.8 mi. NW Sanford, 1. MOORE CO.: 7 mi. S, 14 mi. E Dumas, 3300 ft., 2. OLDHAM CO.: 18 mi. N, 1 mi. W Adrian, 5; 5-6 mi. W Boys Ranch, 3. ROBERTS CO.: 10.5 mi. S, 11 mi. E Spearman, 2; 10 mi. S, 15 mi. E Spearman, 1.

Additional records.—HANSFORD CO.: 10 mi. S, 3 mi. W Gruver (Cutter, 1959c:119).

Neotoma micropus canescens J. A. Allen, 1891
Southern Plains Woodrat

The southern plains woodrat occurs throughout the northern Panhandle where it is common in many areas. There are records from each of the counties in the region north of the Canadian. This species is found primarily in relatively open areas where its conspicuous stick nests may be located at the base of mesquite trees, along brushy fencerows, and in dense patches of *Opuntia* and *Yucca* (see Fig. 16). As noted in the account of *N. albigula*, this rat also occupies rocky areas and outcroppings where the white-throated species is absent. Blair (1954:252), for example, reported *micropus* as "collected on rocky slopes and in crevices of the caprock" in Hutchinson County, but took no *albigula* there.

We have little reproductive data for this species; there are no pregnant females in our sample although one with two suckling young was taken on 15 March. Adult males had testes measuring



FIG. 16.—Nest of *Neotoma micropus* in yucca, northwestern Roberts County.

16, 19, and 20 in July and 15 in November. Juveniles were collected in April, July, and August. An adult female was in seasonal molt on 18 July.

Average (extremes in parentheses) external measurements of 12 adults (three males, nine females) are as follows: total length, 356.3 (340-405); length of tail, 144.8 (130-159); length of hind foot, 37.5 (34-40); length of ear, 27.8 (26-29); weight (nine specimens), 260.0 (162-409). Cranial measurements of selected specimens are given in Table 5.

Specimens examined (69).—DALLAM CO.: 2 mi. N, 13 mi. E Texline, 2; 12 mi. E Texline, 2 (1 MWSU); 10.6 mi. W Stratford, 1; 1.5 mi. N Conlen, 5 (WTSU); 1 mi. N, 6 mi. W Dalhart, 1. HANSFORD CO.: 10 mi. N Spearman, 8 (WTSU); Sanders Ranch, 5 mi. N jct. Texas Hwy. 15 on FM 2387, 1 (WTSU); 6 mi. S, 3 mi. W Gruver, 1 (KU); 6 mi. S, 2 mi. W Gruver, 1 (KU). HARTLEY CO.: 3 mi. S Channing, 4. HEMPHILL CO.: Gene Howe Wildlife Management Area, 6; Lake Marvin, 12 mi. E Canadian, 2. HUTCHINSON CO.: 9 mi. E Stinnett, 15 (UT); Spring Canyon, Lake Meredith, 1 (WTSU). LIPSCOMB CO.: 1 mi. N, 5 mi. E Follett, 1 (WTSU); 2 mi. N, 8 mi. E Lipscomb, 1; 9 mi. E Lipscomb, 1. MOORE CO.: 4 mi. N, 1 mi. E Dumas, 1; 7 mi. E Dumas, 1 (WTSU). OCHILTREE CO.: 12 mi. S, 8 mi. E Perryton, 5; 12 mi. S, 9 mi. E Perryton, 1. OLDHAM CO.: 6 mi. W Boys Ranch, 1. POTTER CO.: Plum Creek Rec. Area, Lake Meredith, 1 (WTSU). ROBERTS CO.: 15 mi. S, 11 mi. E Spearman, 1; Killebrew Ranch (NE part of county), 2 (WTSU). SHERMAN CO.: 10 mi. N Stratford, 3.

Additional records.—HARTLEY CO.: Middle Water (AMNH); Romero (AMNH). LIPSCOMB CO.: Lipscomb (Goldman, 1910:29). OLDHAM CO.: Tascosa (Bailey, 1905:111).

Microtus ochrogaster haydenii (Baird, 1858)

Prairie Vole

Prior to our study, the prairie vole had been reported from southwestern Kansas, northwestern New Mexico, and west-central Oklahoma, but was unknown from the Texas Panhandle. On 15 July 1988, we trapped an adult female, pregnant with four fetuses that measured 5 in crown-rump length, along a fencerow (see Fig. 17) 8 mi. S Spearman, Hansford County (Manning and Jones, 1988). Two weeks later (30, 31 July), six additional voles were taken at the same place—four females, one with two fetuses (23 in crown-rump length), one with three (6 in length), one with four (4 in length), and one nonpregnant, and two males (testes 16 in length for both). The fenceline was overgrown with weeds and grass, principally standing and matted wild oats (*Avena*) and western wheat grass (*Agropyron*), and separated a farm-to-market road from a field of wheat stubble, later tilled. *Spermophilus tridecemlineatus*, *Chaetodipus hispidus*, *Reithrodontomys megalotis*, *Peromyscus maniculatus*, *Sigmodon hispidus*, and *Mus musculus* were taken in the same traplines.

The site south of Spearman, even though only a few miles north of the Canadian River breaks, lies in the drainage of Horse Creek, a tributary of Palo Duro Creek, which in turn flows northeastwardly into the Beaver (or North Canadian) River in the Oklahoma Panhandle (Texas County). The occurrence of *M. ochrogaster* in Trans-Canadian Texas may represent an isolated or semi-isolated population indicative of a more southwestwardly distribution of the species in late Pleistocene or earlier Holocene times. It is to be looked for elsewhere in the drainage basin of Palo Duro Creek and along the Canadian itself in the eastern part of the region. The only other record of *M. ochrogaster* in Texas is of an individual of the subspecies *M. o. ludovicianus* taken in 1902 at Sour Lake, Hardin County, in the extreme southeastern part of the state.

Average external measurements (extremes in parentheses) of our seven adults (five females, two males) are as follows: total length, 161.6 (150-176); tail, 36.1 (30-43); hind foot, 20.1 (19-22); length of ear, 13.0 (12-14); weight of nonpregnant female and two males, 32.0, 39.7, and 54.0, respectively. Average and extreme cranial measurements are: condylobasal length, 28.4 (27.2-30.2); zygomatic breadth, 16.1 (15.3-17.3); postorbital constriction, 3.9 (3.8-4.1); lambdoidal breadth, 12.4 (12.0-13.3); rostral length, 8.8 (8.1-9.4); depth of cranium, 10.8 (10.5-11.4); length of maxillary toothrow, 6.6 (6.2-7.2). Karyotypically, two of our specimens did



FIG. 17.—Roadside habitat where *Microtus ochrogaster* and six other species of small mammals were trapped, 8 mi. S Spearman, Hansford County.

not differ in chromosome number or fundamental number from those previously reported for *M. ochrogaster*.

We follow Choate and Williams (1978) in referring our specimens to *M. o. haydenii*, but the status of *M. o. taylori* (type locality 1.5 mi. N Fowler, Meade Co., Kansas), regarded as a synonym of *haydenii* by Choate and Williams, needs re-evaluation in light of the recent discovery of this vole in the Oklahoma Panhandle and the Texas specimens here reported.

Specimens examined (7).—HANSFORD CO.: 8 mi. S Spearman, 7.

Ondatra zibethicus cinnamominus (Hollister, 1910)

Muskrat

The muskrat evidently occurs along the Canadian River, some of its immediate tributaries, and Wolf Creek, and probably is found elsewhere in the northern Panhandle where permanent water is present, particularly in eastern counties. It may be relatively common in some areas. Blair (1954:253) reported a "dense population . . . in a tule marsh" at the junction of Moore and Bugby creeks in Hutchinson County. Bailey (1905:120) recorded muskrats as "numerous at Clear Creek [Hemphill County], living in fish ponds and irrigation ditches, where they cause considerable trouble by tunnelling into the banks and thus releasing water." He went on (pp. 120-121) to comment on the

habitat of *O. zibethicus* on Cottonwood and First creeks, tributaries of Wolf Creek in Lipscomb County. One female we examined carried four fetuses on 22 July.

Specimens examined (13).—HUTCHINSON Co.: 9 mi. E Stinnett, 2 (UT); 11 mi. E Stinnett, 3 (UT); Sanford Dam, Lake Meredith, 1 (WTSU); behind and below dam, Lake Meredith, 5 (WTSU); spillway, Lake Meredith, 2 (WTSU).

Additional records.—HEMPHILL Co.: 6 mi. E Canadian (UMMZ); Clear Creek (Bailey, 1905:120). LIPSCOMB Co.: First Creek, 15 mi. W Lipscomb (Bailey, 1905:121); Cottonwood Creek, 5 mi. E Lipscomb (Bailey, 1905:120).

Rattus norvegicus (Berkenhout, 1769)

Norway Rat

This introduced species probably occurs in most of the larger towns in the northern Panhandle, and elsewhere in or near human habitations. Feedlots for livestock, whence our specimens from Ochiltree County were obtained, provide excellent food and cover for this rodent. It seems unlikely to us that the related species *Rattus rattus*, also introduced into the Americas from the Old World, ranges into the Panhandle region, because of the relatively harsh climate for a taxon with southern affinities and the lack of large urban environments where it ordinarily thrives.

Specimens examined (2).—OCHILTREE Co.: 1 mi. S, 1 mi. E Perryton, 2.

Mus musculus Linnaeus, 1758

House Mouse

The house mouse, like the Norway rat introduced into the New World from the Old, occurs in suitable environs throughout Trans-Canadian Texas. Most specimens of which we have record were taken in or near human habitations in rural settings, but the species certainly occurs also in urban environments and feral populations occasionally become established in the wild some distance from human influence.

Specimens examined (23).—DALLAM Co.: 12 mi. E Texline, 1; 1 mi. N, 8 mi. W Dallhart, 1. HANSFORD Co.: 8 mi. S Spearman, 3. HARTLEY Co.: 15 mi. W Dumas, 3 (WTSU). HUTCHINSON Co.: 9 mi. E Stinnett, 2 (UT); Bugbee Canyon, Lake Meredith, 1 (WTSU). LIPSCOMB Co.: 1 mi. N, 5.5 mi. E Follett, 5 (WTSU); 2 mi. N, 8 mi. E Lipscomb, 2; 7 mi. E Lipscomb, 2. OCHILTREE Co.: 7 mi. N Perryton, 1. POTTER Co.: Plum Creek Rec. Area, Lake Meredith, 1 (WTSU). ROBERTS Co.: 10.5 mi. S, 11 mi. E Spearman, 1.

Erethizon dorsatum bruneri Swenk, 1916

Porcupine

This unique and conspicuous rodent evidently occurs sparingly in most counties of the northern Panhandle. Local ranchers and

trappers reported to us that porcupines are regularly, though not commonly, seen along the Canadian and its tributaries, and in the Canadian breaks. We have records of occurrence from well beyond these areas as well, frequently of animals killed along roadways. Many local residents shoot porcupines on sight because of the perceived damage done by individuals to the relatively few trees in the Panhandle.

We tentatively refer our material to the subspecies *bruneri* following Hall (1981). Geographic variation has not been studied in *Erethizon*, and two other subspecies, *E. d. couesi*, which is known from south of the Panhandle, and *E. d. epixanthum*, which has been reported from west of the region, possibly are representative of Trans-Canadian porcupines.

Specimens examined (9).—DALLAM CO.: 15 mi. NW Conlen, 1 (WTSU); 21 mi. N Dalhart, 1 (MWSU). HANSFORD CO.: 6 mi. S, 2 mi. W Gruver, 2 (KU); 10 mi. S, 3 mi. W Gruver, 1 (KU). HARTLEY CO.: 6.4 mi. W Channing, 1. HUTCHINSON CO.: 9 mi. E Stinnett, 1 (UT). OCHILTREE CO.: 11 mi. S, 5 mi. E Perryton, 1. ROBERTS CO.: 16 mi. S, 11 mi. E Spearman, 1.

Canis latrans latrans Say, 1823

Coyote

This familiar mammal is a widespread and common inhabitant of the northern Panhandle. We observed coyotes on several occasions foraging by day and often heard them calling in the evening, particularly in broken country that provides favored homesites. Many are trapped in the region each fur season as prime pelts now command a solid price at market.

Specimens examined (22).—DALLAM CO.: 8 mi. N Conlen, 1 (WTSU). HANSFORD CO.: 10 mi. S, 4 mi. W Gruver, 1 (KU). HEMPHILL CO.: 10 mi. N Canadian, 2 (WTSU); 6 mi. N Canadian, 2 (WTSU). HUTCHINSON CO.: 14 mi. SW Stinnett, 1 (WTSU). LIPSCOMB CO.: 1.5 mi. N, 3 mi. E Follett, 1 (WTSU). MOORE CO.: 6 mi. E Dumas, 1 (WTSU). OCHILTREE CO.: 1 mi. N, 1 mi. E Perryton, 1; 9 mi. S, 4 mi. E Perryton, 1; Wolf Creek drainage, SE part of county, 9; 23 mi. S, 10 mi. W Perryton, 1. SHERMAN CO.: 10 mi. S Stratford, 1 (WTSU).

Additional records.—DALLAM CO.: Texline (Bailey, 1905:175). HANSFORD CO.: 1 mi. N Bernstein (Cutter, 1959a:31). HEMPHILL CO.: Clear Creek, Canadian (Bailey, 1905:175). HUTCHINSON CO.: 1 mi. S, 5 mi. E Morse (Cutter, 1959a:31); Turkey Track Ranch (Cutter, 1959a:31); 9 mi. E Stinnett (Blair, 1954:254). SHERMAN CO.: Buffalo Springs (Bailey, 1905:175).

Canis lupus nubilus Say, 1823

Gray Wolf

This large canid was abundant in Trans-Canadian Texas before colonization of the region by European man, particularly in consort with the great herds of bison once found there. Mention

of wolves is commonplace in the historical literature on the region, but references as to specific localities of occurrence are few. Bailey (1905:173) noted that A. H. Howell reported from Lipscomb in July 1903 that *C. lupus* still was found "in small numbers in this [Lipscomb] county, and a few cattle recently have been killed by them." The species long ago was extirpated in the Panhandle region. We use the subspecific epithet *nubilus* following Bogan and Mehlhop (1983).

Vulpes velox velox (Say, 1823)

Swift Fox

This denizen of the central North American plains, once almost extirpated in the Trans-Canadian region, now is a widespread and fairly common inhabitant of flatlands in the region, even some that are intensively farmed. Swift foxes evidently avoid rough, broken country. We know of records from north of the river in all but one of the 12 counties comprising our study area, and we have examined specimens from south of the Canadian in that county (Potter). Stromberg and Boyce (1986) have suggested that *V. velox* may be a monotypic species.

W. L. Cutter (1958*a*, 1958*b*) studied denning and food habits, respectively, of *V. velox* in the northern Panhandle, principally in Hansford County, and reported on other records in a later (1959*a*) paper. He found dens (1959*a*:31) "in open, sparsely vegetated habitats on sloping plains, hilltops, and other well drained situations." Principal foods were reported to be rabbits, small rodents, and grasshoppers. We have record of a female with four nursing pups that was taken on 20 April.

Specimens examined (12).—DALLAM CO.: 21 mi. N Dalhart, 1 (MWSU); 15 mi. W Stratford, 1 (WFSU). HANSFORD CO.: 3 mi. S Bernstein, 1 (KU); 10 mi. W Gruver, 3 (KU); 1 mi. N, 1 mi. E Morse, 2 (KU). HUTCHINSON CO.: 1 mi. SE Morse, 1 (KU). SHERMAN CO.: 3 mi. E Stratford, 1 (KU); 1.5 mi. E Stratford, 1 (KU); no specific locality, 1.

Additional records (Cutter, 1959*a*:31, unless listed above or otherwise noted).—HANSFORD CO.: 1 mi. S, 1 mi. W Gruver; 10 mi. S, 1 mi. W Gruver. HARTLEY CO.: no specific locality. HEMPHILL CO.: no specific locality. HUTCHINSON CO.: 1 mi. S Morse. LIPSCOMB CO.: no specific locality. MOORE CO.: 1 mi. S Dumas (UMMZ). OCHILTREE CO.: no specific locality. OLDFHAM CO.: Tascosa (Bailey, 1905:179). ROBERTS CO.: no specific locality.

Vulpes vulpes fulva (Desmarest, 1820)

Red Fox

There are no published records of the red fox from the northern Panhandle region and we know of no specimens taken

there. However, Layne Allen reported to us that *V. vulpes* is present in the flatlands northwest of Perryton, Ochiltree County. We observed one crossing U. S. Hwy. 83, about 8 mi. N Perryton, just inside Oklahoma. Almost certainly red foxes will be found elsewhere in the region. The species is fairly common at some places on the Llano Estacado to the south.

Urocyon cinereoargenteus scottii Mearns, 1891

Gray Fox

The gray fox evidently is rare in Trans-Canadian Texas and probably has a restricted distribution there. Our only report from the region is from Layne Allen, who trapped one in November 1985 in the southwestern corner of Ochiltree County just at the edge of the Canadian breaks. This was the only gray fox taken by Allen in 12 years of trapping in the area. As is the case also for *V. vulpes*, subspecific assignment is made on geographic grounds.

Ursus americanus Pallas, 1780

Black Bear

The black bear evidently was once fairly common in broken country and along major waterways in the Texas Panhandle (Brown, 1988). Original populations could have represented either the nominate subspecies or *U. a. amblyceps* Baird, 1859 (Jones *et al.*, 1988). Bailey (1905) provisionally referred records from the Prairie Dog Town Fork of the Red River near Washburn and from Mobeetie, both south of the Canadian, to *U. a. americanus*.

Bears occasionally are reported even today in the northern Panhandle, probably animals that had wandered eastward from New Mexico or southeastern Colorado. For example, in the early 1980s, probably 1983 or 1984, a young black bear appeared in the neighborhood of Thompson Grove, 2 mi. N and 13 mi. E Texline, Dallam County. It subsequently was trapped by personnel from the Colorado Division of Wildlife and released in that state.

Procyon lotor hirtus Nelson and Goldman, 1930

Raccoon

The raccoon is a common inhabitant of wooded riparian habitats along the Canadian River and its immediate watershed, and also along Palo Duro and other northward-draining creeks. We even found tracks commonplace along intermittent streams

below the caprock of the breaks. We occasionally observed individuals at night along roadways where they crossed creek beds. Inexplicably, Bailey (1905) made no mention of occurrence of the raccoon in northwestern Texas.

Specimens examined (10).—HANSFORD CO.: 7 mi. S, 3 mi. W Gruver, 1 (KU). HEMPHILL CO.: 10 mi. NE Canadian, 1 (WTSU); Killebrew Ranch, 1 (WTSU). HUTCHINSON CO.: 5 mi. S, 10 mi. E Pringle, 1 (KU). MOORE CO.: 15 mi. E Dumas, 1 (WTSU). OCHILTREE CO.: Wolf Creek, SE part of county, 2. ROBERTS CO.: Killebrew Ranch, NE part of county, 2 (WTSU). SHERMAN CO.: Beaver Bridge, U.S. Hwy. 54, 1 (WTSU).

Additional records.—HANSFORD CO. (Cutter, 1959a): 4 mi. S, 2 mi. E Gruver; 10 mi. S, 2 mi. W Gruver. HEMPHILL CO.: Canadian (Goldman, 1950:38).

Mustela nigripes (Audubon and Bachman, 1851)

Black-footed Ferret

This ferret once occurred widely on the Great Plains, closely associated with the distribution of the black-tailed prairie dog, its principal food. It ranged throughout most of western Texas, but evidently now is extinct within the borders of the state. Only two records of the former occurrence of *M. nigripes* in the northern Panhandle have come to our attention. Bailey (1905:198) noted that A. H. Howell examined a hide of one at Lipscomb in July 1903 that was "killed there the previous summer and was told of a den of them located near First Creek." Much later, Cahalane (1954:421) reported a young one captured alive near Dalhart in May 1953. This animal was said to be "3 to 6 weeks old."

Taxidea taxus berlandieri Baird, 1858

Badger

This species is widespread in Trans-Canadian Texas, but apparently nowhere especially common. We most often observed badgers killed on roadways in July, evidently the time of year males actively seek females with which to breed. We follow Long (1972) in referring our material to the subspecies *berlandieri* although he assigned specimens from the Oklahoma Panhandle to the nominate subspecies, and northwestern Texas may represent an area of intergradation between *taxus* and *berlandieri*.

Specimens examined (8).—HANSFORD CO.: 1 mi. S, 4 mi. W Gruver, 1 (KU). HUTCHINSON CO.: 9 mi. E Stinnett, 1 (UT); 2 mi. SE Stinnett, 1 (WTSU). LIPSCOMB CO.: 3 mi. N, 1 mi. E Follett, 1 (WTSU); 5 mi. E Booker, 1 (WTSU). MOORE CO.: 5 mi. SE Dumas 1 (WTSU); 5 mi. S Dumas, 1 (WTSU). OCHILTREE CO.: 18 mi. S, 5 mi. W Pettyton, 1.

Additional records.—HEMPHILL CO.: 9 mi. NW Canadian (UMMZ); 5 mi. N Canadian (KU); Canadian (USNM). HUTCHINSON CO.: 3 mi. S, 4 mi. E Morse (Cutter, 1959a:32). LIPSCOMB CO.: 9 mi. SW Higgins (KU).

Spilogale putorius interrupta (Rafinesque, 1820)

Eastern Spotted Skunk

This small mustelid evidently is uncommon in Trans-Canadian Texas and also on the Llano Estacado to the south. All specimens from Hansford County were taken near farm buildings (Cutter, 1959a).

Specimens examined (2).—HANSFORD CO.: 16 mi. N, 3 mi. E Gruver, 3200 ft., 1 (KU); 1 mi. N Bernstein, 1 (KU).

Additional records (Van Gelder, 1959:279).—HANSFORD CO.: Bernstein. HEMPHILL CO.: Canadian. MOORE CO.: 4 mi. W Dumas.

Mephitis mephitis varians Gray, 1837

Striped Skunk

The striped skunk is one of the most abundant and widespread carnivores in the northern Panhandle. Individuals frequently were observed along roadways at night, in both agriculturalized areas and rangeland, and many are killed on major thoroughfares by passing vehicles. Females with young or partly grown, solitary young-of-the-year commonly are seen from late spring to mid-summer.

Specimens examined (7).—DALLAM CO.: 2 mi. N, 13 mi. E Texline, 2. HANSFORD CO.: 10 mi. S, 2 mi. W Gruver, 1 (KU). HUTCHINSON CO.: 9 mi. E Sunnett, 2 (UT). MOORE CO.: 4 mi. N, 1 mi. E Dumas, 1; 5 mi. E Dumas, 1 (WTSU).

Additional records.—HANSFORD CO.: 10 mi. S, 4 mi. W Gruver (Cutter, 1959a:32). HEMPHILL CO.: Canadian (Bailey, 1905:201). HUTCHINSON CO.: 3 mi. S, 1 mi. E Morse (Cutter, 1959a:32). LIPSCOMB CO.: Lipscomb (Bailey, 1905:201); Higgins (MVZ).

Felis concolor stanleyana Goldman, 1938

Mountain Lion

This wide-ranging carnivore has the largest natural range of any free-living New World mammal except man. The species once occurred in favorable habitats throughout the Trans-Canadian region, but it was driven to extinction there in the early 1900s. No precise localities of record exist of its previous distribution in the northern Panhandle, but the historical literature contains many references to its former presence. For example, *The Tascosa Pioneer* carried a notice on 31 July 1886 as follows: "The Lee-Scott Cattle Company, we understand, are paying twenty-five dollars apiece for the scalps of panthers and Mexican lions killed on their range or in its immediate vicinity. These animals kill off the young calves" (Panhandle-Plains Hist. Rev., 39:17, 1966).

With a resurgence of populations of *F. concolor* in much of the montane west, several individuals have been taken in recent years in the northern Panhandle, and a few now may be resident in the rougher parts of the Canadian breaks, as they evidently are in broken country in west-central Texas (Engstrom and Maxwell, 1988). In any event, Brent Branham of Dumas was kind enough to provide us with details and photographs of two recently taken mountain lions from the Trans-Canadian region. In the spring of 1984, a young lion, which weighed 111 pounds and measured a little more than 6.5 feet in total length, was shot from a tree on the Fuqua Younger farm in Hartley County, just west of the Hartley-Moore county line, not far from Middle Well. Mr. Branham, a taxidermist, has the mounted animal in his possession. Similarly, in March of 1985, a lion weighing 125 pounds was shot at a farm home along U.S. Hwy. 385, 10 mi. N Dalhart, Dallam County (from a newspaper account provided by Branham). Game wardens have recorded numerous calls concerning lions in the western counties of the region over the past decade; ranchers reported to us their occurrence in the breaks of southern Hartley and northern Oldham counties.

Felis rufus texensis (J. A. Allen, 1895)

Bobcat

The bobcat is widely distributed in the rough, broken country of the northern Texas Panhandle. Many landowners, hunters, and trappers regularly see these cats but they are apparently nowhere especially common. We follow Schmidly and Read (1986) in referring all Texas bobcats to the subspecies *texensis*.

Specimens examined (7).—HARTLEY CO.: 10 mi. SE Romero, 1 (TCWC); no specific locality, 1 (TCWC). HEMPHILL CO.: 2 mi. E Canadian, 1 (TCWC). LIPSCOMB CO.: no specific locality, 1 (TCWC). OCHILTREE CO.: 9 mi. S, 11 mi. E Spearman, 1; no specific locality, 1 (TCWC). POTTER CO.: 37 mi. NE Amarillo, 1 (TCWC).

Additional records.—HARTLEY CO.: Channing (AMNH). HUTCHINSON CO.: 2 mi. S, 10 mi. E Pringle (Cutter, 1959a:32); Turkey Track Ranch (Cutter, 1959a:32); 9 mi. E. Stinnett (Blair, 1954:255).

Cervus elaphus Linnaeus, 1758

Wapiti or Elk

Although our perusal of historical literature revealed no mention of wapiti in Trans-Canadian, Texas, Hall (1981) mapped it as once occurring there (as the subspecies *C. e. canadensis* Erxleben, 1777). Furthermore, Murie (1951:39) wrote

as follows concerning this species: "The few available reports . . . indicate that elk at one time occurred in the Texas Panhandle." Furthermore, the Texas Parks and Wildlife Department established a ruling in 1987 to protect wapiti in six counties of the Texas Panhandle, where a few had been seen from time to time over the past two decades. Their origin is unknown, but probably they are wanderers from the established population in Union County, New Mexico, presumed descendents of animals of the subspecies *C. e. nelsoni* V. Bailey, 1935, introduced there in 1911 from northwestern Colorado.

Odocoileus hemionus crooki (Mearns, 1897)

Mule Deer

This deer now is relatively common in rocky canyons and on juniper-covered, rocky hillsides of the Canadian breaks, and probably occurs in other broken country of the northern Panhandle as well. We have observed animals in the field on many occasions. In the spring of 1988, for example, we saw several small groups of mule deer in northwestern Roberts County and a female with fawn on Rita Blanca Creek west of Channing, Hartley County.

Mule deer were introduced into the Panhandle of Texas in the 1960s from the Trans-Pecos region (Wallmo, 1981), but there is no question that *O. hemionus* is native to the region, having been observed along the Canadian River by members of the Long Expedition in 1820 (Brown, 1988). Gowan (1956) recorded (as the subspecies *O. h. hemionus*) mule deer from the western part (Hartley and Oldham counties) of the northern Panhandle. There is an estimated annual harvest of between 100 and 200 individuals in the region.

Odocoileus virginianus texanus (Mearns, 1898)

White-tailed Deer

The white-tailed deer is more or less restricted to riparian woodlands in Trans-Canadian Texas. The first published report of *O. virginianus* in the region evidently was by James (1823), who chronicled Major S. H. Long's expedition to the Rocky Mountains and the return along the Canadian River. Reintroductions of white-tails were made in the years 1941, 1943, and 1953, to augment once declining populations, but all of these, insofar as we know, were of individuals of the native subspecies, *O. v. texanus*. A few are harvested each year by hunters.

Bailey (1905:64-65) recorded this species at Canadian, Hemphill County, in 1903 as "occurring in small numbers in brushy bottoms." From Hutchinson County, Blair (1954:256) reported the white-tailed deer from 9 mi. E Stinnett, and Cutter (1959a:32) listed it from 2 mi. S and 10 mi. E Pringle and 13 mi. NE Stinnett. Cutter also recorded the species from 4 mi. N and 10 mi. E Gruver, Hansford County. We observed white-tails along the Canadian River in Oldham County.

Antilocapra americana (Ord, 1815)

Pronghorn

This mammal of the open plains once was abundant in the north and elsewhere in the Texas Panhandle, probably representing the nominate subspecies, *A. a. americana*. Hunted almost to extinction by the turn of the century, the pronghorn, through wise protection by state and federal agencies and numerous reintroductions, is again a familiar sight on rangelands throughout much of its former distribution in Texas and elsewhere. Reintroductions began in the late 1930s; those in the Trans-Canadian region were made in 1942, 1946, and 1955. Reintroduced animals came mostly from the Southwest, representatives of the race *A. a. mexicana* Merriam, 1901. The pronghorn now can be seen regularly on open range, especially in the central and western counties of the northern Panhandle. In spring 1988, we observed a female with two young in northwestern Roberts County, for example, chased three adults for several hundred yards along a farm-to-market road southwest of Dumas, and saw animals elsewhere in Moore County and in Hartley County. Predation by coyotes on young is thought to be a serious limiting factor to population growth in the northern Panhandle.

Bailey (1905) and Cutter (1959a) reported pronghorns from several localities in the region, and Nelson (1925) published on the status of the species in the period 1922-1924, reporting some animals still extant at that time in all northern Panhandle counties except Lipscomb. The largest recorded estimate by Nelson (1925:54) was of 350 pronghorns in Hartley County.

Bison bison bison (Linnaeus, 1758)

Bison

Several million bison once ranged over the southern High Plains, what then was known as the "great southern herd," which was mostly destroyed in the years 1870 through 1878. It is

axiomatic that, to our knowledge, not a single museum specimen exists of the literally hundreds of thousands killed by humans in the northern Texas Panhandle. Aside from small captive herds, like the one of about 75 head at Darrouzett, Lipscomb County, no bison remain in the region.

The historical literature is replete with accounts of bison in Trans-Canadian Texas. Suffice it here to record but a few of these references. The last individuals were killed in Lipscomb County in 1878 (Anon., 1976), whereas "a few remained in the northwest corner of the Pan Handle until 1889, when W. T. Hornaday estimated their number at 25" (Bailey, 1905:69). As late as 1878, however, a large herd of bison was observed crossing the Canadian River at Pitcher Creek, Potter County, "forming a solid black line from a quarter to half mile wide" and could be seen for 30 miles to the north (Key, 1972:69). In Hansford County, one hunter, James Hamilton Cator, was reported personally to have killed 16,000 bison in the period 1872-75 (Anon., 1980). In Moore County, "early observers reported that single herds contained as many as five hundred thousand animals" (Thomas, 1967:3). Wolves became a problem as predators on domestic livestock only after extinction of the vast herds of bison.

SPECIES OF POSSIBLE PRESENT OR PAST OCCURRENCE

Following is a listing of 22 species that may occur or once may have occurred in the northern Texas Panhandle. Those included have been recorded from near the region in Texas or in adjacent states, and their presence in the Trans-Canadian part of the state is possible, probable, or, in the case of several migrating bats, highly likely. The list was compiled on the basis of specimens examined by us, from others reported in the literature, and from the summary published by Jones *et al.* (1987).

Myotis lucifugus (little brown myotis).—Recorded from northeastern New Mexico. To be looked for in Canadian breaks in western part of region.

Myotis velifer (cave myotis).—Known from nearby parts of Texas and adjacent states. Probably will be found as summer resident of region.

Myotis yumanensis (Yuma myotis).—Recorded from northeastern New Mexico and western Oklahoma Panhandle. To be looked for in broken country, particularly in western part of region.

Lasionycteris noctivagans (silver-haired bat).—Seasonal migrant to be looked for in spring and late summer or early autumn in any part of northern Panhandle. Recorded from Oklahoma Panhandle and from just south of region (WTSU specimens) from: Borger, Hutchinson County; 3 mi. SW Amarillo, Potter County; and Canyon, Randall County.

Pipistrellus hesperus (western pipistrelle).—Known from rocky caves and crevices near watercourses in eastern New Mexico and the Llano Estacado caprock of Texas. May be found in rocky cliffs along Canadian River and its tributaries.

Pipistrellus subflavus (eastern pipistrelle).—Known from western Oklahoma, from Llano Estacado caprock to south, and from Collingsworth County, Texas, in the southeastern Panhandle. May occur in rocky areas in eastern part of region.

Plecotus townsendii (Townsend's big-eared bat).—Cavernicolous species to be looked for in rocky caves and crevices, especially as a wanderer in mid- and late summer. Specimens (TTU) have been examined from just south of the Canadian River from Boger, Hutchinson County, and McBride House, Lake Meredith, Potter County. The species also has been recorded from east, north, and west of the northern Panhandle.

Tadarida brasiliensis (Brazilian free-tailed bat).—Almost certainly occurs in Trans-Canadian region in warm months, both in maternity colonies and in groups dispersing from colonies there or elsewhere prior to southward autumn migration. Known from all surrounding states.

Tadarida macrotis (big free-tailed bat).—Large, distinctive, free-tailed species is to be looked for as seasonal migrant in any part of region.

Spermophilus variegatus (rock squirrel).—Recorded from adjacent New Mexico and western Oklahoma Panhandle. Possibly occurs in rocky areas in western part of region.

Reithrodontomys fulvescens (fulvous harvest mouse).—Known as near northern Panhandle as Armstrong County, Texas. Doubtfully occurs in southeastern part of region.

Peromyscus attwateri (Texas mouse).—Saxicolous species found north along Llano Estacado breaks at least to Armstrong County. Doubtfully occurs in rocky habitats in southern part of region.

Peromyscus boylii (brush mouse).—Occupies rocky, brushy habitats along eastern edge of Llano Estacado, and in eastern New Mexico and adjacent Oklahoma. Same as for *P. difficilis*.

Peromyscus difficilis (rock mouse).—Known from northeastern New Mexico and westernmost Oklahoma Panhandle. To be looked for in rocky habitats in extreme western part of region.

Peromyscus truei (piñon mouse).—Known from rocky, juniper-dominated habitats as far north in Panhandle as Armstrong and Briscoe counties. Same as for *P. attwateri*.

Baiomys taylori (northern pygmy mouse).—Northward movement of this species in past century well documented. Recently taken in Collingsworth County in southeastern part of Texas Panhandle (Hollander *et al.*, 1987). To be looked for in grassy fencerows and similar habitats in southeastern part of region.

Neotoma mexicana (Mexican woodrat).—Recorded from eastern New Mexico and western Oklahoma Panhandle. To be looked for in brushy, rocky country in western part of region.

Ursus arctos (grizzly or brown bear).—Possibly once may have roamed into Trans-Canadian Texas from west. Now extirpated.

Bassariscus astutus (ringtail).—All of northern Panhandle well within recorded distribution of species. To be looked for in rocky and wooded canyons and breaks.

Mustela frenata (long-tailed weasel).—Fairly common on Llano Estacado to the south, and recorded from nearby to the north and west; no specimens known from northern Panhandle. Species to be looked for in any part of 12-county region.

Mustela vison (mink).—Possibly occurs, albeit sparingly, along Canadian River and perhaps other relatively large waterways in region, particularly in eastern part.

Lutra canadensis (river otter).—Apparently no longer occurs in northern Texas Panhandle, but undoubtedly found there at one time, at least along Canadian River and major tributaries. Nearest recorded occurrence is Mobeetie, Wheeler County (Bailey, 1905:196), in early part of century.

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